October 1946

Chemical Industries

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STARCH for ADHESIVES

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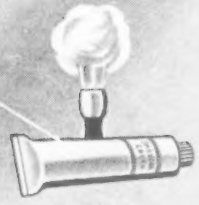

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$CH_2=CHCH=CH_2 + HBr \xrightarrow{\text{antioxidant}} CH_2=CHCHBrCH_3$
$CH_2=CHCH=CH_2 + HBr \xrightarrow{\text{peroxide}} CH_3CH=CHCH_2Br$

Reaction with Alcohols:

$RCH_2OH + HBr \longrightarrow RCH_2Br + H_2O$

Reaction with Esters:

$RCOOR' + HBr \longrightarrow R'Br + RCOOH$

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THE CHEMICAL BUSINESS MAGAZINE

Chemical Industries

VOLUME 59
NUMBER 4

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THE READER WRITES

Technical Men's "Will To Win"

To the Editor of Chemical Industries:

While sitting in a friend's office the other day, I happened to pick up a copy of the February 1946 "CHEMICAL INDUSTRIES" in which I read with interest two editorials—"The Will to Win" and "A Time for Real Leadership."

In the former, you may recall, you described the mental attitude of many of the technical men engaged in the Manhattan Project and suggested that the colleges and universities try to instill into technical training more of "the will to win."

Ironically enough, on the very next page, in another editorial you state that now is the "time for real leadership" to throw off the dead hand of seniority, of hereditary succession, of political maneuvering. In my opinion your second editorial is the real answer to the first—and the colleges have nothing to do with the problem.

ERNEST M. MAY
Wilmington, Delaware

Phthalic Manufacture West of Mississippi

To the Editor of Chemical Industries:

In the July issue of CHEMICAL INDUSTRIES on page 68, line 7, the statement is made that the establishment of Oronite's plant in California for making phthalic anhydride constitutes the first manufacture of phthalic anhydride west of the Mississippi.

I'm sure you can imagine the caustic comments this statement has elicited from the Monsanto staff considering the fact that the John F. Queeny Plant at St. Louis, Missouri, has been making phthalic anhydride since World War I, and in very large quantity.

This comment is passed on to you solely because I know you endeavor at all times to present the subject matter in your magazine in strict compliance with fact.

B. E. THOMAS
Monsanto Chemical Co.
St. Louis, Missouri

Thanks, Mr. Thomas, for calling our attention to this obvious error. Monsanto's St. Louis plant has long been one of the country's leading manufacturers of phthalic anhydride. This makes Oronite the second producer west of the Mississippi and the first on the West Coast—EDITOR.

"Operation Welfare"

To the Editor of Chemical Industries:

Permit me to add my congratulations on the excellence of the feature article "Operation Welfare" presented in your July 1946 issue.

EMANUEL LITVIN
College of Pharmacy
Rutgers University
New Brunswick, N. J.

More on Fertilizers

To the Editor of Chemical Industries:

I have a most sincere felicitation for CHEMICAL INDUSTRIES which I always find to be a good guide and source of technical information in line with my profession as a chemical engineer. Allow me, therefore, to congratulate you for your fine and admirable articles.

I can only add the hope and suggestion that you please include more articles about fertilizers and their manufacture, and treatises on agricultural chemistry and engineering—subjects which would indeed help us greatly in solving the agricultural rehabilitation of the Philippines.

MAMERTO V. BILLANO
Department of Chemistry
Colegio de San Agustin
Iloilo City, Philippines

53:124, Not 52:122

To the Editor of Chemical Industries:

It has been called to our attention that we have an error in Item 3 of the bibliography accompanying our article on "Inorganics," which appeared in the August, 1946, issue of CHEMICAL INDUSTRIES. As corrected, the reference should read: Chem. & Met. Eng. **53** (2) 124 (1946).

We regret this oversight on our part.

R. K. ILER
E. I. du Pont de Nemours & Co., Inc.
Cleveland, Ohio

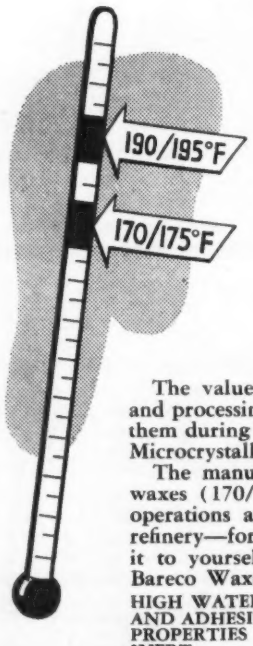
Classification System for Chemical Market Data

To the Editor of Chemical Industries:

I read, with great interest, the letter by Miss Irene M. Strieby re information sources for chemical market research and I do think it would be extremely helpful if CHEMICAL INDUSTRIES would undertake the compilation of a basic subject heading list.

The market research will become very important for every industry within the next two or three years and recent conversations with other librarians in this state have convinced me of the need for such a list.

H. J. ZWILLENBERG, Technical Librarian
The Adelaide Chemical & Fertilizer Co.,
Port Adelaide, South Australia



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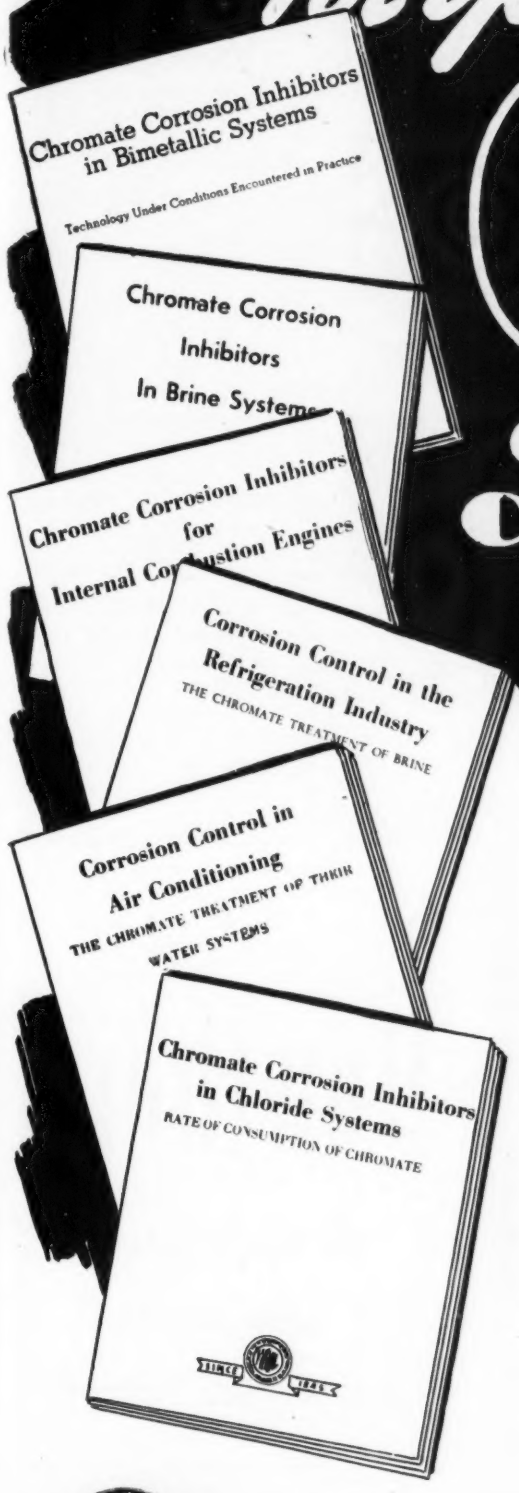
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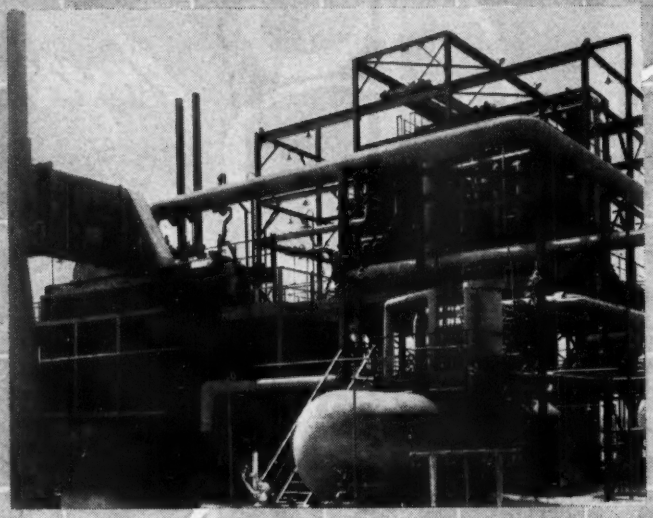

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CHEMICALS INDISPENSABLE TO INDUSTRY AND AGRICULTURE

WASHINGTON

T. N. SANDIFER *reporting*

Bureau of Standards Expansion . . . Mead Committee . . . CPA Doomed Soda Ash Exports . . . Insecticides Legislation . . . FPC Gas Controls

New Fields for Bureau of Standards

IT IS EXPECTED that the next Congress will receive a request for greatly augmented appropriations to enable the National Bureau of Standards to expand its activities in atomic energy research and in rubber development.

It is understood that the Bureau is already eyeing the problems involved in industrial potentialities of atomic fission, and those in setting standards and measurements of atomic energy. If this assignment is passed to the Bureau, which appears logical to authorities here, it would involve enlargement during the coming year of both staff and laboratory facilities.

In another field, there is a possibility that functions now performed by the Rubber Development Corporation might be assumed eventually by the Bureau's scientists, as the war-born RDC demobilizes. However, this last, although probable, is not definite.

No official word has come from the Bureau of Standards on any of this. Nevertheless, it is expected that some formal detailed explanation of Bureau plans will be forthcoming later in the Fall, after they have taken shape more completely, and various conferences involved have taken place.

FPC Not Pressing "End Use" Gas Controls

DURING THE RECENTLY concluded investigation into natural gas industry activities by the Federal Power Commission, considerable criticism was voiced by industry spokesmen of the suspected trend toward FPC control of natural gas "end uses" and similar leanings to national controls.

Earlier in the summer, in specific cases, the Commission appeared heading in this direction. In a more recent case, however, affecting a natural gas corporation operating in New York and Pennsylvania, the Commission has withdrawn earlier restrictions on this company, explaining that with the end of the war there is not the same need for conservation of gas.

The industry interpretation is that FPC is taking a more conservative attitude in the matter of controls. This is by no means finally established, and subsequent cases may show the matter more clearly.

In a related matter—the disposal and ultimate use of the Government-owned oil pipe lines—which some gas interests have sought to acquire for transportation of natural gas, the Government still adheres to use of the lines for oil, rather than gas.

At the same time there are signs that War Assets Administration anticipates a long struggle no matter who buys the lines. It has established a review board, and is taking other steps, which indicate it desires to be able to make a case in any subsequent political issues that may be raised by a new Congress.

Award of bids may not come until some time late in October, it is now thought.

Civilian Production to Pass?

ALTHOUGH CIVILIAN PRODUCTION Administration was extended to next June 30, some background reports give it only until early spring, possibly next March, before liquidation. At that time, according to these sources, Housing will absorb remaining essential priority functions, except in such technical fields as rubber, or remaining scarce chemicals, etc., which may be lodged elsewhere around the Capital.

Much will hinge on the make-up of the incoming Congress, whether it is still control-minded, or inclined to force the issue of freeing industry and business to find its own way.

Too the extent of recovery in production of conversion-vital materials in chemical as well as other industries will have a bearing on the situation.

National Defense Investigation Highlights

CERTAIN PHASES of the investigation into the war-time programs of various agencies have special interest for the chemical field as just reported in a supplementary statement by the Senate Special Committee making this investigation (Mead).

Some highlights are the committee's view that government production controls during the war, "although frequently successful, were confusing and very often resulted in duplication and inefficiency."

The committee reported "there is an urgent need for a technical study to be made of the methods of control which were most successful in each field, to be utilized in any future plans."

Of particular interest was this: "Our anti-trust, patent and other governmental policies should be shaped toward progress by the United States in all new fields for the benefit of business and for the protection of the country from a national defense standpoint.

"These anti-trust and patent policies and the purchase and development work for our armed forces should be coordinated with the purpose of providing adequate protection to the United States in national defense as well as serving all the other purposes for which such policies are designed."

Much emphasis was placed on acquisition of strategic stockpile materials from foreign sources, coupled with the warning that many such natural resources of this country were seriously depleted in the effort to supply needs of other nations as well as our own, as a war measure.

The report was very critical of the carbon black program, commenting that "due to the inability of various agencies to agree on a program because of differences of opinion as to the amount needed in the tire program" the matter was left to an interagency committee, headed by a WPB official, not named in the report, but whom the report charged "dominated the situation" with the result that the program was adversely affected, in the committee's opinion. This charge was leveled in a general criticism of the policy of establishing individual "czars" for major production materials, petroleum, coal, etc.

Recalling that during the height of the war several interagency disputes reached "a most serious stage" the report revealed what some Washington observers knew, but could not comment on at the time, that "at one point the Undersecretary of War, the Rubber Director, Undersecretary of the Navy, and the Petroleum Administrator reached such a violent impasse that they offered to air their differences before this committee" and were recon-

ciled only after a public display of lack of their coordination.

The report, of course, attacks the Canol project, in connection with its criticism of the attempts of service bureaus to dominate procurement, production, and other war policies.

Soda Ash Industry Watching Export Situation

A RECOMMENDATION that all soda ash exports be placed under license by the Office of International Trade, successor to the Foreign Economic Administration, has been made by soda ash industry representatives.

The OIT reported recently to an industry committee that 45,000 tons of soda ash were exported from the United States in the first half of 1946. Only a small fraction of these exports were traceable to the original producers, leading to a conclusion that some original purchasing consumers were diverting their supplies to export. In view of the currently short supply for domestic requirements, a suggestion was made that export controls might be helpful.

Uniform State Law on Insecticides Under Preparation

REPRESENTATIVES OF FEDERAL and State agencies, State officials, trade associations and other interested groups, met with Department of Justice officials early in September to discuss a uniform State law for control of insecticides moving in interstate commerce.

Less than half the States have compulsory regulation of poison formulas involved in these compounds, it was recalled.

The House Agriculture Committee reported favorably at the last session of Congress (H. R. 5645) to regulate the marketing of economic poisons and devices, and to replace the Insecticides Act of 1910. This bill was lost in the last minute Congressional log-jam.

Flaxseed Plantings Set at High Levels

THE DEPARTMENT OF AGRICULTURE has called for 4 million acres planted to flax for 1947, to stimulate production of linseed oil. This compares with 2.5 million this year. Industrial requirements for linseed oil are expected to be the heaviest in recent years, due to expanding demands of paint, linoleum and protective coatings manufacturers.

New Priorities Regulation Covers Scarce Chemicals

THE CIVILIAN PRODUCTION Administration has established a procedure under which purchases of certain materials held in Government stocks may be made. A new priorities regulation, #34, was issued in this connection, but makes no substantial change in procedure and policy in general. However, ethyl alcohol, molasses, quinine and related alkaloids, rubber, natural rubber, and rubber latex, butyl and GR-S synthetic, all require CPA authorization to purchase, with reference to either Chemicals or Rubber Divisions.

In addition, restrictions govern many metallurgical and chemical ores and concentrates.

Chemical Gardens Under Quartermaster Corps Study

GROWING GARDENS in virtually synthetic crop ground proved so valuable in coral-crusted and volcanic ash South Pacific areas during the war that the War Department has launched an intensive study of the possibilities through the Quartermaster Corps.

A laboratory functioned at Coral Gables, Fla., during the war, and units were stationed at a number of isolated island posts during this period operating experimental gardens. The system, as implied in its nomenclature—"soilless culture" or nutriculture, hydroponics, etc., involves growing fruits and vegetables in sand, gravel, volcanic cinders, or other suitable materials, by using chemical elements added to the material in which the plants are grown.

Knipling Named Chief of Entomology

APPOINTMENT OF Edward F. Knipling to head the Division of Insects affecting man and animals, has been announced by the Department of Agriculture. He succeeds Emory C. Cushing, resigned from Government service. Mr. Knipling, native of Texas, graduate of Texas A. & M., and Iowa State, has been with the Bureau of Entomology since 1931. He served as senior entomologist at the Orlando Laboratory of the Division where he helped develop insecticides and methods of insect control which led to the effective use of DDT. He has been awarded the Typhus Commission Medal for this service.

Interstate Commerce Commission

AN EXAMINER'S RECOMMENDATION is before the Interstate Commerce Commission that the Commission approve rates applicable on cleaning, scouring or washing compounds, as the rates also on smoke flue cleaning compounds.

OTS Casualties

FOUR PROMINENT chemical men, Joseph H. Percy, Colgate-Palmolive-Peet Co.; R. Max Goepp Jr., Atlas Powder Co.; R. E. Zane, consultant; and Ludwig Valik, S. B. Penick & Co., lost their lives in the Newfoundland airplane crash of Oct. 3. Mrs. Zane was also killed in the disaster.

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SHARPLES { MONOBUTYLAMINE $C_4H_9NH_2$ / TRIBUTYLAMINE $(C_4H_9)_3N$

Sharples Monobutylamine and Tributylamine are readily available in commercial quantities. They are versatile chemicals of interest for a variety of applications as listed below:

CURRENT AND SUGGESTED APPLICATIONS

MONOBUTYLAMINE

- Intermediate for:
  - Pharmaceuticals
  - Dyestuffs
  - Rubber Chemicals
  - Emulsifying Agents
  - Insecticides
  - Surface Active Agents

TRIBUTYLAMINE

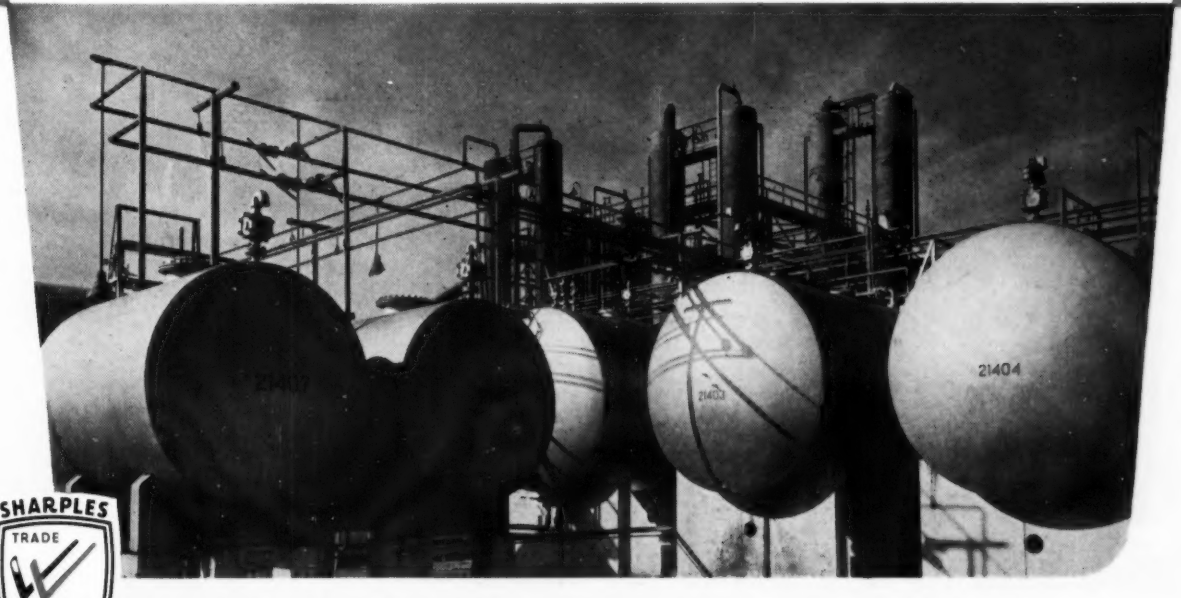
- Corrosion Inhibitor in hydraulic brake fluid formulations.
- Intermediate for manufacture of rubber accelerator activator.
- Solvent

SPECIFICATIONS

Color	Water White
Specific Gravity at 20°/20°C	0.74-0.76
Acid Insolubles	Not over 1.0%
Water Dilution	At least 5:1
Butylamine content — at least	94%
Distillation:	
Initial boiling point	Not below 73.0°C.
Not less than 95%	Below 82.0°C.
Final boiling point	Not above 86.0°C.

Color	Pale Yellow
Specific Gravity at 20°/20°C	0.78-0.79
Acid Insolubles	Not over 0.40%
Tributylamine content — at least	98.5%
Distillation:	
95% between	199-216°C.

We will be glad to cooperate with those who are interested in investigating the applications of these amines. Samples will be furnished at your request.



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ORTHOPHEN* (o-AMYLPHENOL)
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PENTALARM* (AMYL MERCAPTAN) VULTACS* (ALKYL PHENOL SULFIDES)
PENTALENES* (AMYL NAPHTHALENES)

AMYLAMINE ETHYLAMINE BUTYLAMINE
DIAMYLAMINE DIETHYLAMINE DIBUTYLAMINE
TRIAMYLAMINE TRIETHYLAMINE TRIBUTYLAMINE
DIETHYLAMINOETHANOL
ETHYLETHANOLAMINE
ETHYLDIETHANOLAMINE
ETHYLETHANOLAMINES 161
DIBUTYLAMINOETHANOL
BUTYLETHANOLAMINE
BUTYLDIETHANOLAMINE
DI-sec-AMYLPHENOL
AMYL CHLORIDES
DICHLORO PENTANES
o-tert-AMYLPHENOL
DI-tert-AMYLPHENOL
DIAMYLPHENOXYETHANOL
TETRAETHYLTHIURAM DISULFIDE
TETRAETHYLTHIURAM MONOSULFIDE
TETRAMETHYLTHIURAM DISULFIDE
ZINC DIETHYLDITHIOCARBAMATE
ZINC DIMETHYLDITHIOCARBAMATE
ZINC DIBUTYLDITHIOCARBAMATE
CUPRIC DIETHYLDITHIOCARBAMATE
SELENIUM DIETHYLDITHIOCARBAMATE
o-sec-AMYLPHENOL
AMYL SULFIDE

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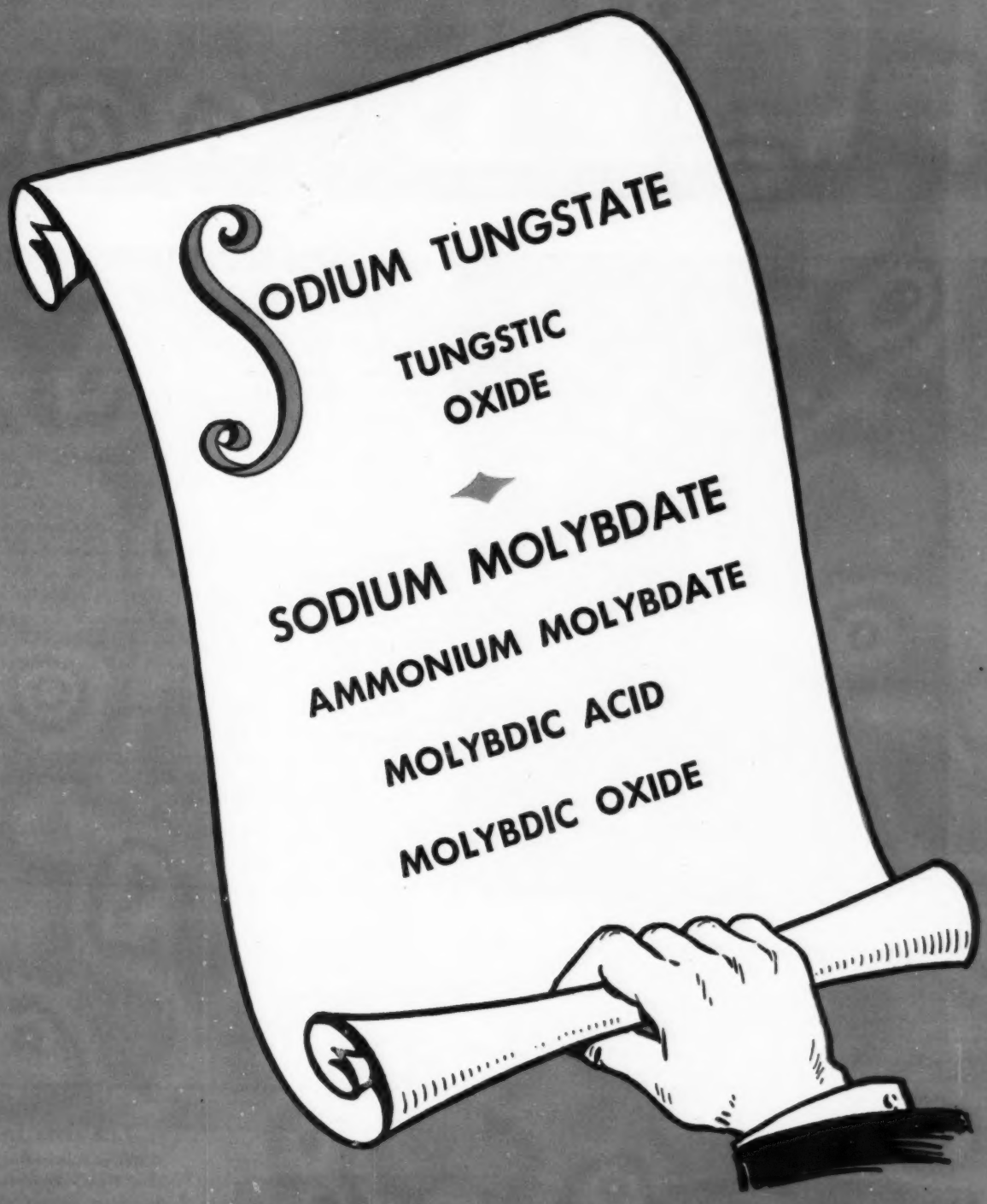

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LIFE...ON THE

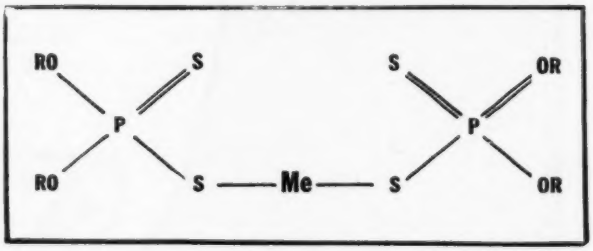
AEROLUBE* DITHIOPHOSPHATE ADDITIVES FOR BETTER LUBRICATING OIL

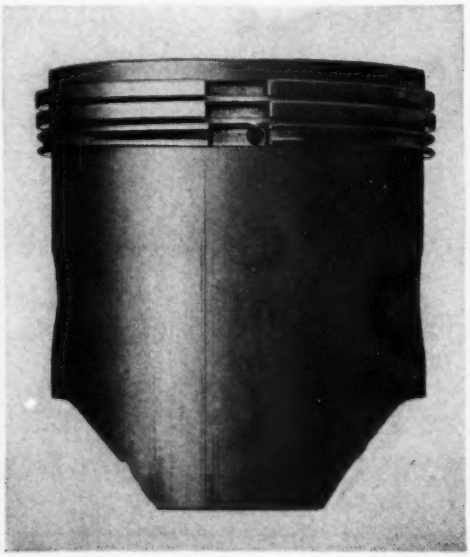
AEROLUBE Dithiophosphates are oil soluble, stable chemical compounds specifically prepared for use as additives in lubricating oils. As shown by the chemical formula below, they are metallo-organic compounds containing sulfur and phosphorus.

Certain of these dithiophosphates are powerful inhibitors and provide oxidation stability to the base stock treated, thereby preventing the formation of acidic, varnish and sludge forming oxidation products in internal combustion engines. They also inhibit bearing corrosion by forming a thin protective film on the bearing and other metallic surfaces. Most dithiophosphates are non-corrosive soaps which, in motor oils, have a dispersant action on asphaltines, resins, gums, and other oxidation products so that they remain dispersed in the oil and are removed from the engine when the oil is drained. Also, some of the dithiophosphates are excellent detergents and maintain maximum engine cleanliness.

Complete information on the properties, applications, and test results of AEROLUBE Dithiophosphates are available from the Petroleum Chemicals Department of Cyanamid.

(*Above*) **THE PROPER COMBINATION OF ADDITIVES** to produce the desired qualities in motor oil can be selected on the basis of test and experience. A premium grade oil containing an additive with oxidation and bearing corrosion inhibiting properties is normally preferred for passenger car service. For truck, bus, and diesel engines, a heavy duty oil is required which contains an additive with both inhibiting and detergent properties.





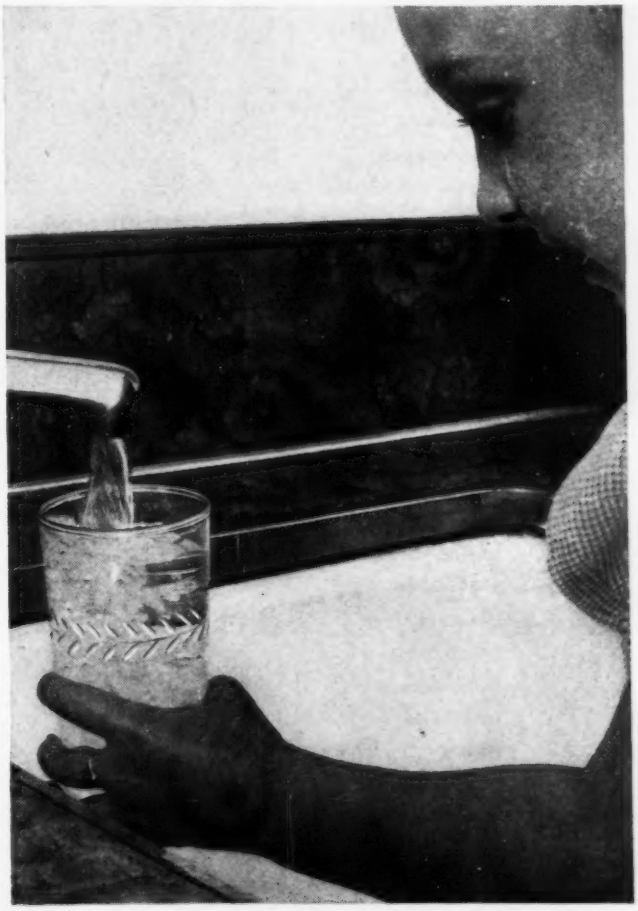
(*Left*) **THE ADVANTAGE OF AN ADDITIVE** in lubricating oils is evident by a comparison between the two pistons shown here. The piston on the left is shown after an engine test run with an uninhibited lubricating oil. In this test, the entire engine was dirty and bearing corrosion high. The piston on the right was used in an identical engine test run with a small percentage of AEROLUBE added to identical lubricating oil. The engine was clean and bearing corrosion low. Cleaner engines and lower bearing corrosion, resulting from the use of AEROLUBE additives, mean more efficient and longer engine operation, at only a small additional cost in lubrication.

CHEMICAL NEWSFRONT

(*Above*) **HERE'S AN INNOVATION IN COFFEE BREWING,** said to make clear, excellent tasting coffee entirely free from grounds or other impurities. Boiling water is poured through a conical filter paper containing coffee. Instead of a conventional handle, moldings of MELMAC* plastic, product of Cyanamid's Plastics Division, are placed at the narrow neck of this Chemex Coffeemaker. The MELMAC plastic parts, molded by Plastic Molding Company, Sandy Hook, Conn., are attractive in appearance and also have insulating properties which protect the server from scorched fingertips.

*Reg. U. S. Pat. Off.

(*Below*) **"SWEEPING WATER CLEAN"** is the function of aluminum sulphate or "alum" in the purification of municipal water supplies. Most natural waters carry a large quantity of organic and inorganic matter in suspension, which must be coagulated before it can be removed. The addition of alum to the water results in the formation of small, insoluble particles about which the impurities collect. Like snowballs rolling down hill, these nuclei grow larger and heavier and sink to the bottom as the minute particles of "floc" gather about them. In this way the water is "swept" clean of foreign matter and rendered clear and colorless. The aluminum hydroxide formed precipitates over an extensive pH range, making the addition of outside alkali unnecessary in most cases. Cyanamid produces a specially developed alum which is used by an increasing number of communities because of its superior coagulating properties.



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FEATURED CHEMICALS in the PFIZER FAMILY

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- Ammonium Oxalate
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- Calcium Gluconate
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- Citrate Esters
- Cream Tartar
- Fumaric Acid
- Gluconic Acid
- Glucono Delta Lactone
- Iron and Ammonium Citrates
- Iron and Ammonium Oxalate
- Iron Gluconate
- Iron Oxalate
- Niacin
- Niacinamide
- Oxalates
- Penicillin
- Potassium Iodide
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- Tartaric Acid
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Riboflavin is a many-purpose vitamin, outstandingly successful in three major applications (1) as a pharmaceutical, (2) in flour enrichment concentrates, and (3) in poultry feed mixtures.

Pfizer is a name many people think of first when they think of riboflavin. Users know that this vitamin as commercially produced at Chas. Pfizer & Co., Inc. embodies many safeguards of high quality . . . and also that its preparation is under the supervision of trained chemists and engineers.

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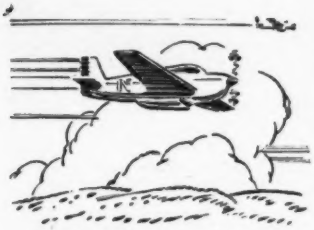
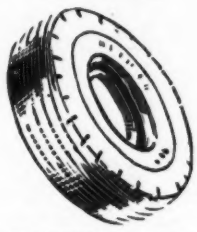


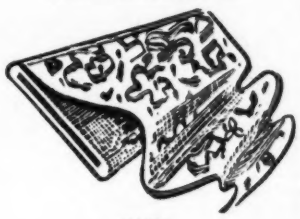
HIGH OCTANE GASOLINE

LUBRICANTS



SYNTHETIC RUBBER

PHARMACEUTICALS



DYES

VARNISHES

How will you have your Aluminum Chloride?

Uniformity is of course your first requisite, and that's what you get from Hooker. Every shipment of Hooker Aluminum Chloride, Anhydrous, is of the same high purity as the previous one. You can count on uniform results in your processes where they depend on uniform purity of the Aluminum Chloride you use.

Is size of importance in your operations? Hooker Aluminum Chloride is available in three different sizes—one of which will surely meet your requirements:

Fine Grind—an unscreened material practically all passing 20 mesh.
Coarse Grind—unscreened, 1 mesh and finer containing 25 to 35% finer than 20 mesh.
Coarse Screened—same as above screened to remove 20 mesh and finer.

Whether you want to use Aluminum Chloride for a catalyst in Friedel-Crafts synthesis, polymerization, isomerization or halogenation, Hooker can supply it in the form best suited for your processes. As a catalyst in the preparation of derivatives for use in the manufacture of high octane gasoline, lubricants, synthetic rubber, dyes, varnishes, pharmaceuticals, etc., Hooker Aluminum Chloride has a freedom from iron and other impurities that insures smooth reactions.

Hooker Data Sheet No. 714, yours for the asking on your company letterhead, gives additional physical and chemical data. Hooker's Technical Staff is also ready to help you with the application of Aluminum Chloride and the other Hooker Chemicals to your particular problems.

HOOKER SPECIFICATION

Aluminum Chloride, Anhydrous, $AlCl_3$

Gray, Crystalline solid

Molecular Weight	133.3

Analysis

Aluminum Chloride	98.5 % min.
Iron	0.05% max.
Non-sublimables in air at 950°C	1.5 % max.

HOOKER ELECTROCHEMICAL COMPANY

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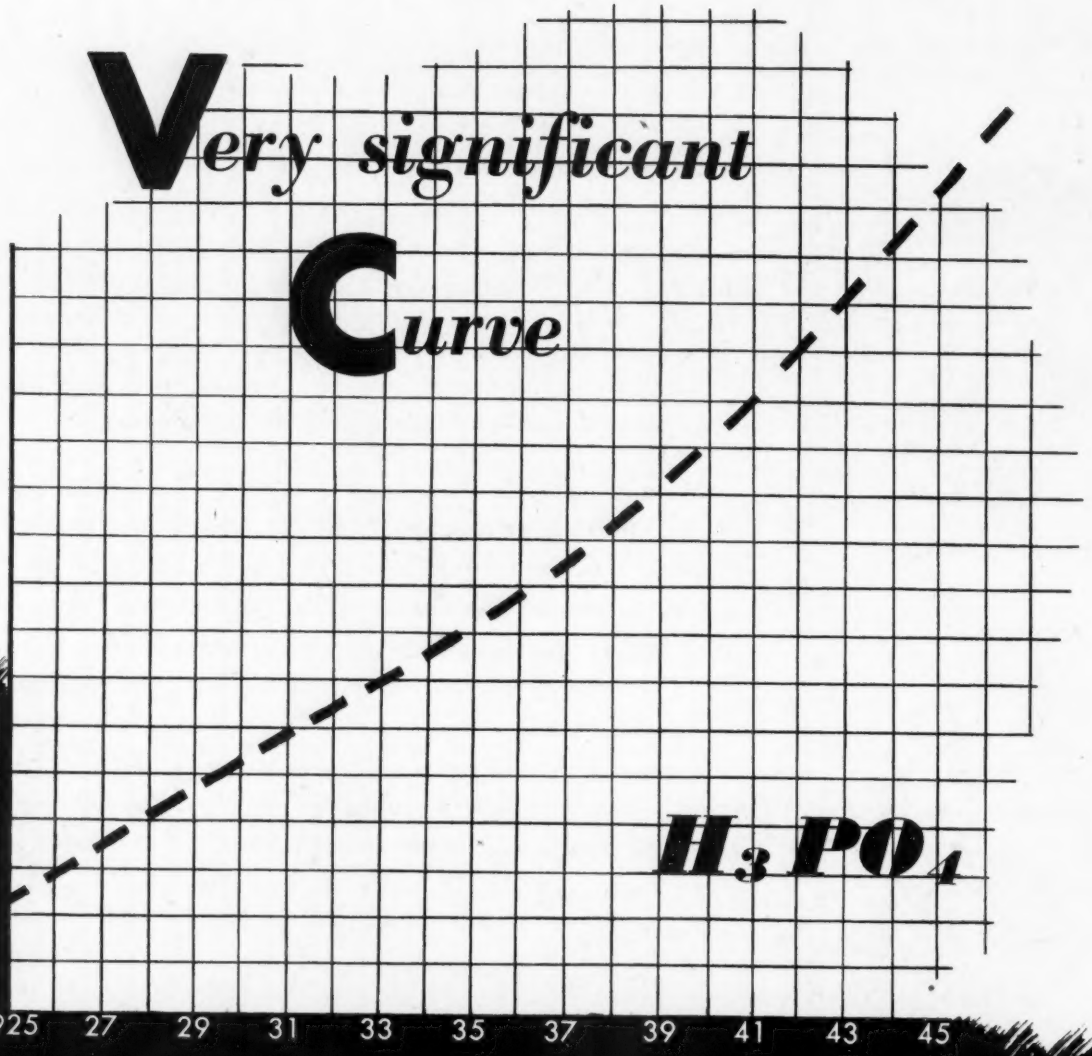
Antimony Trichloride
Muriatic Acid
Chlorine
Sodium Sulfide
Sodium Sulfhydrate

Very significant Curve



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find increasing acceptance with new users . . . paralleling the industry trend dictated by the many newly-discovered advantages of these high purity chemicals. Let V-C H_3PO_4 help run your cost curve down, your profit curve up. Whether you need a barrel, a carboy, or a tank car, your inquiry will receive our prompt attention.

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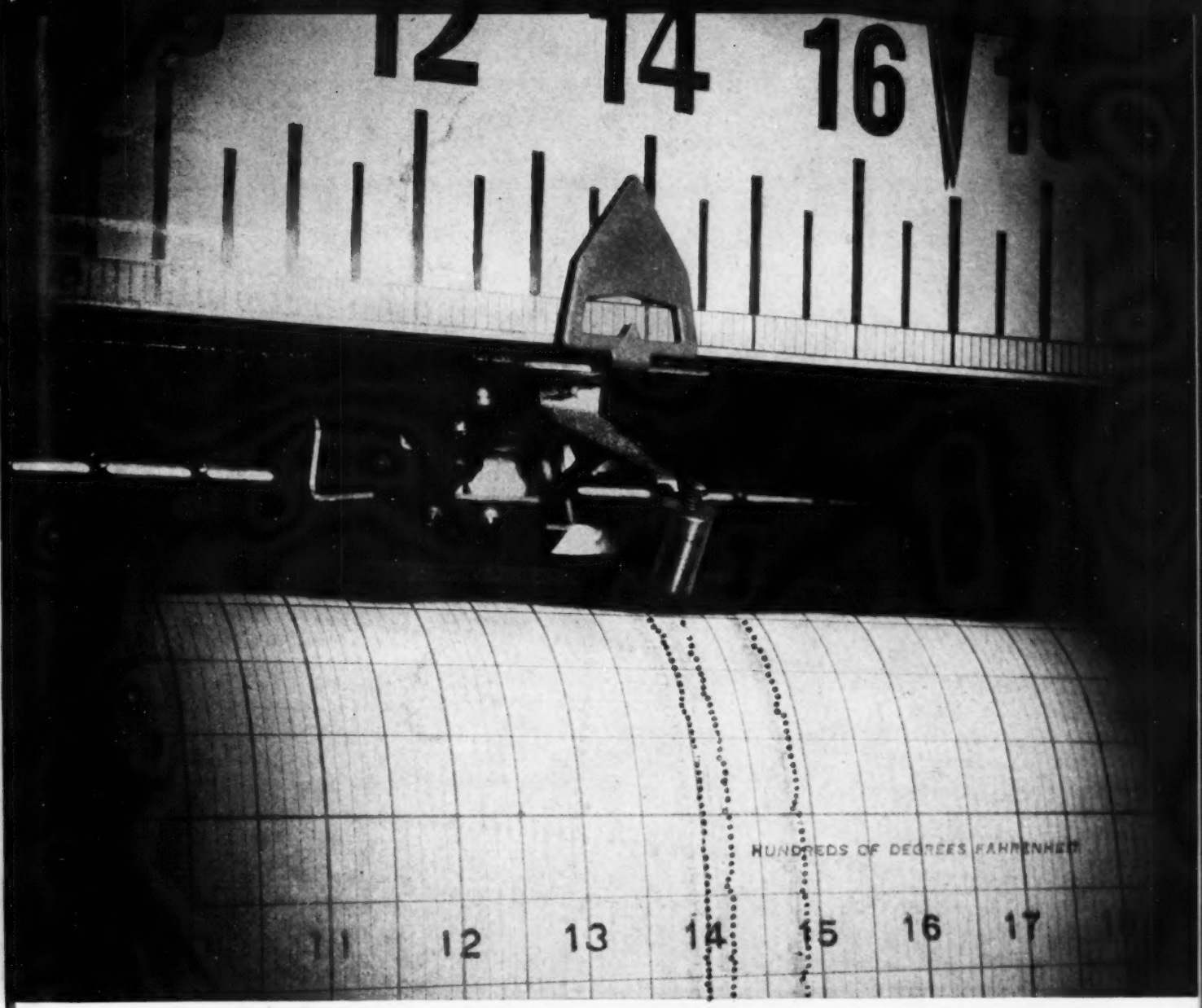
RICHMOND 5 VC CHEMICALS VIRGINIA

HAND IN HAND WITH INDUSTRY



What Have These Red Lines to do with Neoprene Compounding?

Experts agree that Magnesium Oxide is the most sensitive ingredient in the compounding of Neoprene. Baker controls this sensitivity. Special electric furnaces, the only ones of their kind used in industry, keep the red lines straight—positive indication that calcining temperatures never vary more than 5%.

Temperature control and uniformity—both are important factors in supplying light Calcined Magnesia of satisfactory quality to Neoprene Compounders. They are factors you get in Baker's Light Calcined Magnesia. For free samples address J. T. Baker Chemical Company, *Executive Offices*, Phillipsburg, N. J.

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J. T. Baker Chemical Co., *Executive Offices and Plant:* Phillipsburg, N. J.
Branch Offices: New York, Philadelphia, Boston and Chicago.

Baker's Chemicals

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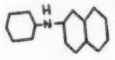
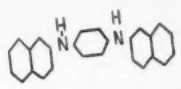
has available for sale these organic chemicals



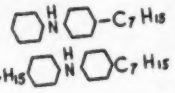
Phenyl B Naphthyl Amine

Distilled—Available in commercial quantities
M. P. 107°
Purity 99.5%
Commercial—Available in commercial quantities
M. P. 106°
Purity 98.0%



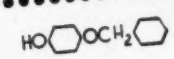
Di B Naphthyl p Phenylene Diamine

Available in commercial quantities
M. P. 230° C
Purity 98%



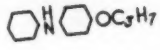
Mixed Mono-and Diheptyl Diphenyl Amines

Available in commercial quantities
Distillation range—145-245
(3.0 mm)
Purity 98%



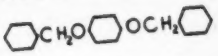
Monobenzyl Ether of Hydroquinone

Available in commercial quantities
M. P. 113°
Purity 90%



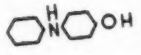
Isopropoxy Diphenyl Amine

Available in commercial quantities
M. P. 78°
Purity 92% min.



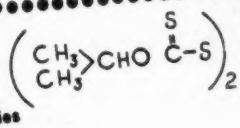
Dibenzyl Ether of Hydroquinone

Available in Pilot Plant quantities
M. P. 119°
Purity 85%



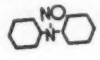
p Hydroxy Diphenyl Amine

Available in commercial quantities
M. P. 15°
Purity 92%



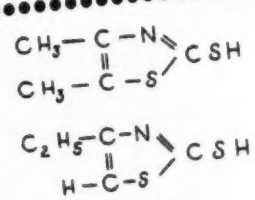
Di Isopropyl Dixanthogen

Available in commercial quantities
M. P. 52°
Purity 98%



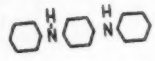
N-Nitroso Diphenyl Amine

Available in commercial quantities
M. P. 62°
Purity 97%



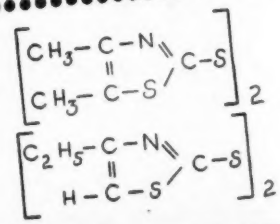
Mixed Ethyl and Dimethyl Mercaptothiazoles

Available in commercial quantities
M. P. 136-153°
Purity Approximately 85% dimethyl and 15% ethyl mercaptothiazoles



Diphenyl p Phenylene Diamine

Available in commercial quantities
M. P. 144°
Purity 92%



Mixed Aliphatic Thiazyl Disulfides

Available in commercial quantities
Liquid

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Epichlorohydrin

CONSIDER THIS HIGHLY REACTIVE INTERMEDIATE

Availability of Epichlorohydrin (1-Chloro-2,3-epoxypropane) in tank car quantities offers many new opportunities to the chemical industry.

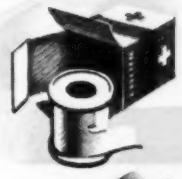
Epichlorohydrin reacts through its epoxide structure with a variety of compounds possessing "active" hydrogen atoms, including: water, acids, phenols, alcohols, mercaptans, ammonia, and amines. In these reactions the epoxide ring opens at the terminal carbon atom to give alpha-gamma substituted derivatives of glycerin.

Since the chlorine in Epichlorohydrin is also reactive, varying combinations of the epoxide ring, chlorine atom, hydroxyl group, amine radical, ether linkage and ester structure are possible *in the same molecule.*

In addition, a wide variety of substituted polyethers can be obtained by polymerization of Epichlorohydrin or its epoxy derivatives.

SURFACE-ACTIVE AGENTS

DYES



RUBBER CHEMICALS

ADHESIVES

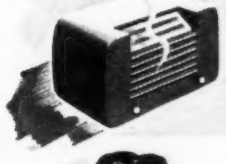
STABILIZERS

PHARMACEUTICALS

ACID-GAS ABSORBENTS

FUMIGANTS

RESIN INTERMEDIATES



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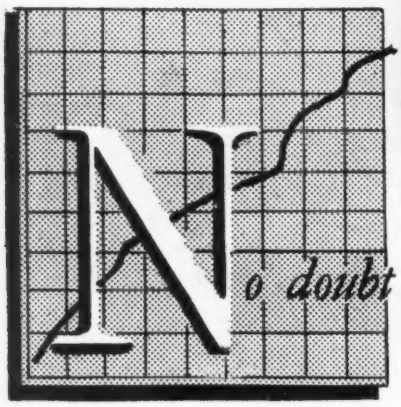
Technical Booklet SC: 46-3 which gives physical and chemical properties of Epichlorohydrin is available on request. Write for your copy.

FOR FATTY ACIDS AND THEIR DERIVATIVES THE TREND IS TO HARDESTY



No doubt about it!

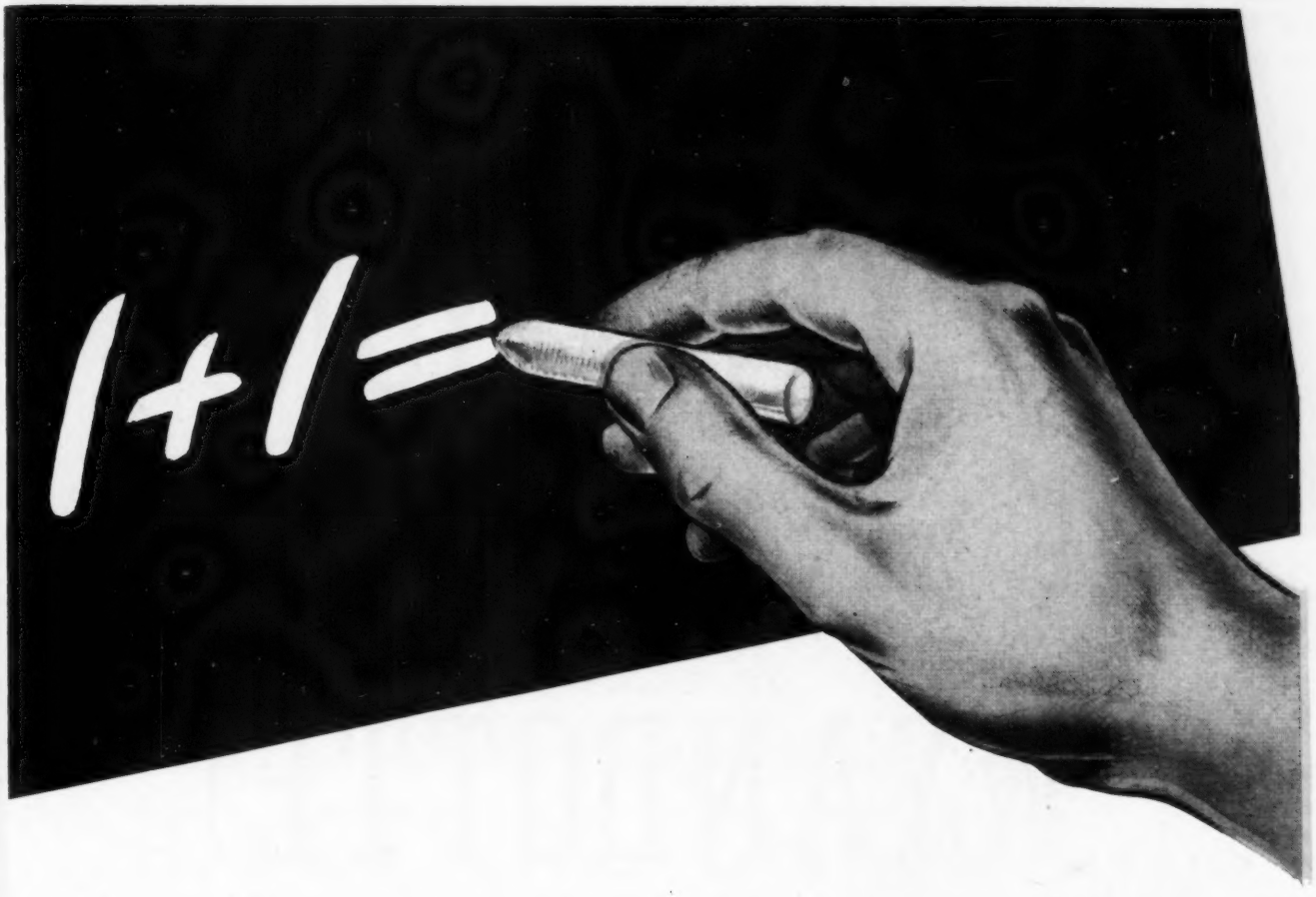
The trend to HARDESTY for fatty acids and their derivatives started when our first shipment was made. It was accentuated during the war when HARDESTY provided many answers to problems created by shortages of imported raw materials. And even now, many manufacturers who followed the trend to HARDESTY simply as a war time expedient have decided—on the basis of superior performance for less cost—*never* to go back to high priced imports.

There's a reason behind this trend to HARDESTY — above and beyond HARDESTY'S dependable quality fatty acids . . . HARDESTY'S research laboratory and technical service department are constantly demonstrating to manufacturers how they can save money by first consulting HARDESTY on a new problem.

HARDESTY products are made in various grades to meet the requirements of the chemical, cosmetic, soap, rubber and other industries. At present it is impossible to render the traditional Hardesty Prompt Service but if you have a problem, our knowledge and experience in fatty acids and their derivatives are ready to go to work for you. We can show you with information and samples why it pays TO KEEP IN TOUCH WITH HARDESTY. W. C. HARDESTY COMPANY, 41 East 42nd Street, New York 17, N. Y. Factories: Dover, Ohio; Los Angeles, Calif.; Toronto, Canada

HARDESTY PRODUCTS. STEARIC ACID • RED OIL • GLYCERINE • STEARINE PITCH • WHITE OLEINE • HYDROGENATED FATTY ACIDS • ANIMAL AND VEGETABLE DISTILLED FATTY ACIDS

W·C· HARDESTY COMPANY



ONE PLUS ONE CAN EQUAL ONE!

Hard-to-blend ingredients can be joined into a unified, perfectly balanced formula with Kelco Algins to insure complete stabilization and uniform suspension.

KELCO ALGINS are equally applicable as STABILIZERS, SUSPENDING AGENTS, EMULSIFIERS, BODYING AND THICKENING AGENTS or HYDROPHILIC COLLOIDS. They readily adjust themselves to such varied uses as food and dairy products, tooth paste, lubricating jellies, boiler feed water compounds, textile printing pastes, hand lotions and countless other applications.

KELCO ALGINS are non-variable . . . adjust themselves to critical changes of environment . . . produce consistently uniform results. They are products of nature, free of impurities—and surprisingly economical. Consult our technical department today—it is at your service.

KELCO
REFINED ALGIN PRODUCTS

KELCO COMPANY

20 N. Wacker Drive, CHICAGO-6 | 31 Nassau Street, NEW YORK-5 | 530 W. Sixth Street, LOS ANGELES-14

Cable Address: KELCOALGIN—New York

EXPANSION AT WYANDOTTE!

Here's important news for industries that need chemicals! To help meet the tremendous post-war demand, Wyandotte Chemicals Corporation is investing twenty-five million dollars in an extensive plant expansion program.

This program, already under way, will be completed within eighteen months. It will mean greatly increased production of chemicals already being supplied by us — such as soda ash, chlorine, calcium carbonate.

The erection of our new glycol plant will provide materials to facilitate the production of many articles — ranging from radiator anti-freeze for automobiles through brake fluids, cosmetics, tobaccos, silk, wool, cotton and fumigants.

Our new synthetic detergent plant will enable us to meet many industrial needs.

In the meantime, Wyandotte will maintain its policy of allocating production with the utmost fairness to its regular customers at all times. And we shall be looking forward to the day when we can supply more.

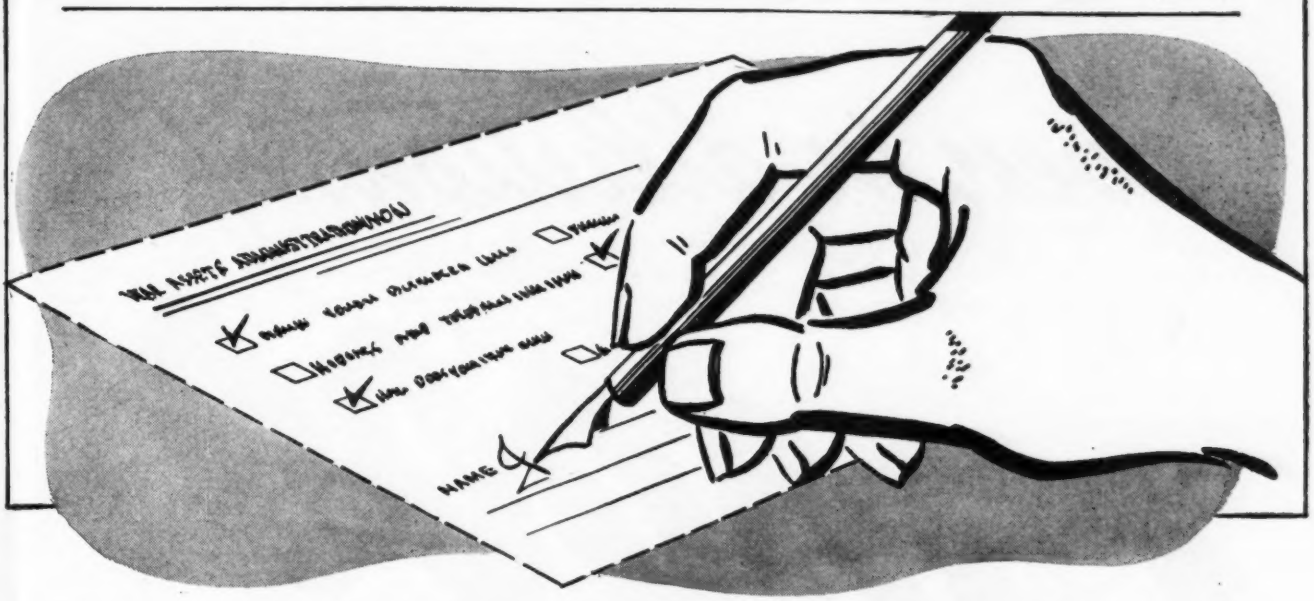
OFFICES IN PRINCIPAL CITIES

Wyandotte
REG. U. S. PAT. OFF.

WYANDOTTE CHEMICALS CORPORATION • MICHIGAN ALKALI DIVISION • WYANDOTTE MICHIGAN

Soda Ash • Caustic Soda • Bicarbonate of Soda • Calcium Carbonate • Calcium Chloride • Chlorine
Hydrogen • Sodium Zincates • Aromatic Intermediates • Dry Ice • Other Organic and Inorganic Chemicals

..GOVERNMENT-OWNED SURPLUS PROPERTY..



How to Locate Short Supply and Special Items of

INDUSTRIAL CHEMICALS

IF you need hard-to-get industrial chemicals, why not contact your War Assets Administration Regional Office? If what you are looking for is not in local supply, the WAA has set up a special Inter-Regional Sales Division to help find it for you—*quickly*—if it is available anywhere in the country.

Remember, there are hundreds of items in the vast stock pile of War Surplus industrial chemicals, many *at below-market prices!* Among them you may find the chemicals *you* want. All items are ready for quick sale and you may arrange convenient credit terms. Your nearest WAA Regional Office is listed below. Write today—or use the coupon below.

ONCE-IN-A-LIFETIME BUYS!

- Acids
- Gas cylinders (all types)
- Dyes and intermediated
- Plastic materials
- Solvents
- Sealing and caulking compounds
- Zinc carbonate
- Picric acid
- Welding fluxes
- Detergents and cleaners
- Water treating compounds
- Calcium chloride
- Dimethylaniline
- Coal-tar
- Borax and boric acid
- Metal salts, oxide and hydroxides
- Pitches
- Gases
- Rubber processing chemicals
- Copper naphthenate
- Synthetic & natural glues
- Printing inks (black & colors)
- and most other chemicals

FREE FACTS

War Assets Administration (address nearest Regional Office)

Please supply without obligation, prices, available quantities and locations of items written in below:

....

....

....

.....

(Describe item wanted)

Name..... Tel. No.....

Firm.....

Address.....

City..... State.....

155-5

All chemicals are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

Much surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

33 REGIONAL OFFICES TO SERVE YOU

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

SULFRAMIN is an

even in dilutions of

1 to 10,000

Sulframin, prepared in powder, paste, and liquid forms, is a synthetic, organic detergent that manufacturers of dyeing assistants, tanning specialties, laundry detergents, and general cleaners, should know.

ULTRA Chemical WORKS

ULTRA CHEMICAL WORKS, Inc.

effective detergent

Sulframin DT and Sulframin LW (Powder)

Powerful foaming agents and emulsifiers. Unsurpassed wherever hard water presents a problem. LW has a higher Lauric content, and consequently, is preferable when used in water colder than 50° C. Textile processors and manufacturers of dyeing assistants, tanning specialties, bath preparations, laundry detergents, and automotive cleaners, use either type, depending upon the temperature of the solution to be used.

Sulframin DH (Paste)

A concentrated neutral detergent adaptable to the manufacture of various scouring, boiling off and dyeing assistants.

Sulframin DT (Paste)

Is a strictly neutral synthetic detergent which has extremely high wetting qualities. Manufacturers of dyeing assistants and textile processors use it principally in compounding scouring and dyeing preparations to function wherever alkali solutions are to be avoided.

Sulframin DR

Is a neutral detergent having the appearance of a clear, sulfonated oil. It is immediately soluble in either hot or cold water. Sulframin DR is an ideal scouring and wetting out agent; and therefore can be employed advantageously as a straight product or in conjunction with various sulfonated oils. It lends itself ideally to the compounding of shampoos, liquid soaps, and liquid cleansers.

Sulframin P

A powerful built up detergent which is invaluable in the preparation of household detergents and cleaners. It is particularly efficient in washing machines, packaged laundry detergents, and general cleaners.

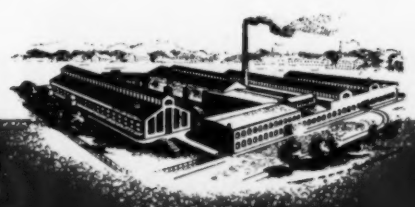
Sulframin DHL

An ideal leveling agent for the solution of your most vexing dyeing problems. It has powerful leveling and penetrating qualities and assures complete satisfaction in the processing of rayon and acetate fabrics. DHL also lends itself ideally to compounding; and is used extensively in the tanning industries for wetting-back applications.

Sulframin N

Although of radically different chemical structure, Sulframin N shares many of the advantages inherent in the other Sulframin products. Its strongest feature is its complete immunity to the effects of inorganic acids and alkalis. Consequently it is preferred in the processing and dyeing of wool. Not only is Sulframin N an outstanding leveling agent; it can also be employed safely with any amount of alkali.

Ultrapone, a liquid emulsifying agent (especially useful in water-in-oil emulsions), is readily dispersible in water, and is soluble in all organic compounds, such as hydrocarbons, alcohols, esters, etc. Formulated to lend greater cleaning power to naphtha solutions, Ultrapone is particularly valuable in dry-cleansing detergents; adhesive emulsions, and in the manufacture of many cosmetics.



PATERSON, NEW JERSEY • CHICAGO, ILLINOIS

IN CANADA: Delta Chemical Company, Brantford, Ontario IN MEXICO: Icon, S. A., Mexico, D. F.

COMPLETE COVERAGE

U.S.I. resins

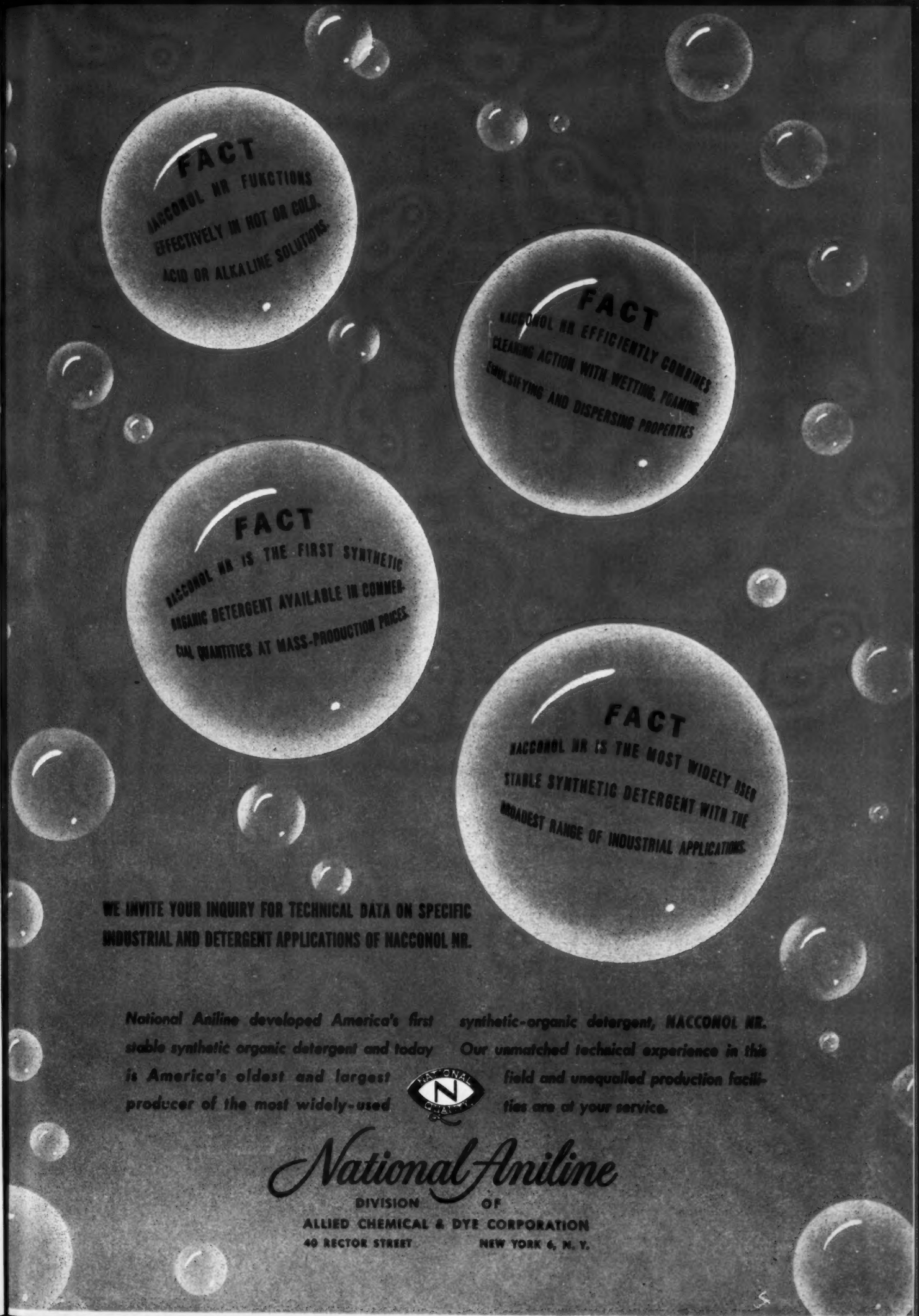
Yes . . . U.S.I. resins are manufactured to meet the requirements of a wide variety of applications. The complete resin line is designed for use in protective coatings, inks . . . and for many specialty purposes.

Technical information on the properties and applications of U.S.I. resins are yours for the asking. Just write or phone our office nearest your plant.

The Complete Resin Line

ESTER GUM — *all types*
CONGO GUM — *raw, fused and esterified*
AROPLAZ* — *alkyds and allied materials*
AROFENE* — *pure phenolics*
AROCHEM* — *modified types*
NATURAL RESINS — *all standard grades*
**Reg. U. S. Pat. Office*

U.S.I. INDUSTRIAL CHEMICALS, INC.
60 East 42nd Street, New York 17, N. Y.


FACT
NACCONOL NR FUNCTIONS EFFECTIVELY IN HOT OR COLD, ACID OR ALKALINE SOLUTIONS.
FACT
NACCONOL NR EFFICIENTLY COMBINES CLEANING ACTION WITH WETTING, FOAMING, EMULSIFYING AND DISPERSING PROPERTIES
FACT
NACCONOL NR IS THE FIRST SYNTHETIC ORGANIC DETERGENT AVAILABLE IN COMMERCIAL QUANTITIES AT MASS-PRODUCTION PRICES.
FACT
NACCONOL NR IS THE MOST WIDELY USED STABLE SYNTHETIC DETERGENT WITH THE BROADEST RANGE OF INDUSTRIAL APPLICATIONS.
WE INVITE YOUR INQUIRY FOR TECHNICAL DATA ON SPECIFIC INDUSTRIAL AND DETERGENT APPLICATIONS OF NACCONOL NR.
National Aniline developed America's first stable synthetic organic detergent and today is America's oldest and largest producer of the most widely-used synthetic-organic detergent, NACCONOL NR. Our unmatched technical experience in this field and unequalled production facilities are at your service.
NATIONAL QUALITY
National Aniline
DIVISION OF
ALLIED CHEMICAL & DYE CORPORATION
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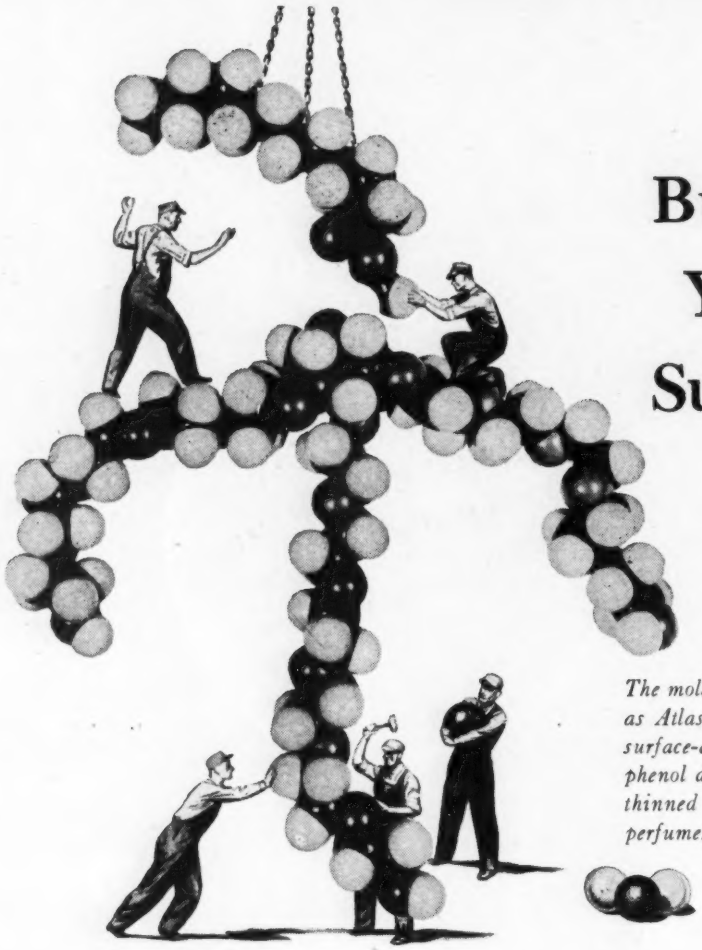


ATLAS
Builds the Molecule You Need for Your Surface-Active Agent

The molecule "in construction" here is popularly known as Atlas Tween 20. One of a large group of compatible surface-active agents, it is used in emulsions of kerosene, phenol derivatives, resins and linseed oil . . . in water-thinned paints, crude coal tar dispersions . . . even in perfumes and cream colognes.

Of course, every chemist knows that building a molecule is not as simple as our illustration may indicate. But this is a graphic way to present the miracle of Atlas molecule building. Atlas makes a large and varied group of non-ionic surface-active agents. One or more of them will probably suit your needs exactly. But if not, Atlas "molecule builders" will be glad to "construct" a surface-active agent for you.

Spans, Tweens and other Atlas non-ionic emulsifiers, wetting agents, anti-foaming agents and spreaders, are derived from the hexahydric alcohols, mannitol and sorbitol. The asymmetric character of these alcohols makes possible the formation of several isomeric anhydrides, which may be esterified to obtain hundreds of complex partial esters with properties unobtainable in simple derivatives.

Atlas surface-active agents range all the way from complete oil solubility to complete water solubility. They are compatible with each other and with most other industrial chemicals. They produce emulsions which are stable to freezing and electrolytes.

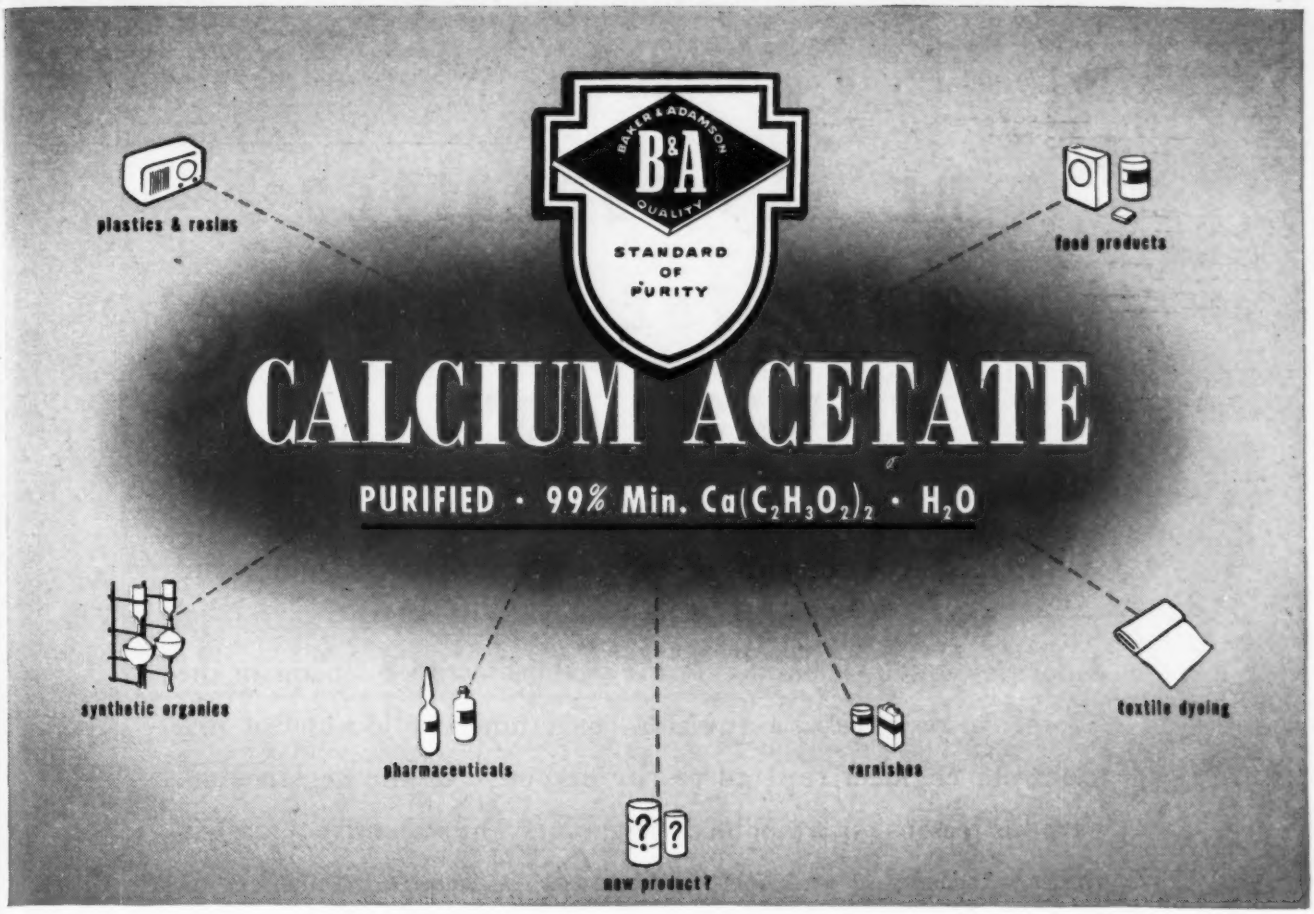
Call on Atlas with your emulsifier problems. As a starter, send for the Atlas Spans and Tweens booklet illustrated on the right.

Span and Tween: Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • ***Offices in principal cities*** • ***Cable Address—Atpowco***



Quality by the Carload

B&A *Purified* Calcium Acetate in commercial quantities . . . another example of the ability of General Chemical Company's Baker & Adamson Division to produce *quality by the carload* in supplying the fine chemical needs of American Industry.

Here is a quality chemical . . . assaying 99% min. $Ca(C_2H_3O_2)_2 \cdot H_2O$ . . . which is far superior to ordinary acetate of lime for the manufacture of pharmaceuticals, plastics, food products and other commodities where high purity of process materials is indispensable.

Many are the established applications of this B&A Fine Chemical. Perhaps it has a place in your process too. If so, let us know your requirements now. And remember—whether you need purified Calcium Acetate in bottle, drum, or even carload lots—Baker & Adamson can supply it promptly and steadily. That's important when your production schedules press.

REAGENTS
STANDARD OF PURITY
FINE CHEMICALS

GENERAL CHEMICAL COMPANY

BAKER & ADAMSON DIVISION

40 RECTOR STREET, NEW YORK 6, N. Y.

Sales and Technical Service Offices: Albany* • Atlanta • Baltimore • Birmingham* • Boston • Bridgeport Buffalo* • Charlotte* • Chicago* • Cleveland* • Denver • Detroit* • Houston • Kansas City Los Angeles* • Minneapolis • New York* • Philadelphia* • Pittsburgh* • Providence • St. Louis* San Francisco* • Seattle • Wenatchee (Wash.) • Yakima (Wash.)
In Wisconsin: General Chemical Wisconsin Corporation, Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks carried here.

HE WAS SURPRISED WHEN THE ANSWER WAS "NO"

DURING recent months one of our industrial development engineers was in the office of an executive of one of America's large industries which is considering the establishment of a plant in the South. In response to a question concerning the location of this plant our engineer replied to the executive in the negative and gave his reasons for a modified viewpoint. The executive remarked that the reasoning was sound—that he wanted our engineer to work with him further as his plans for a new location developed.

We want industries which locate in Alabama to be successful. Therefore, our industrial development engineers present full and impartial facts about any area or location in which you might be interested. Naturally, they are enthusiastic about Alabama as offering opportunities for industries but they do not permit their enthusiasm to overrun sound business judgment.

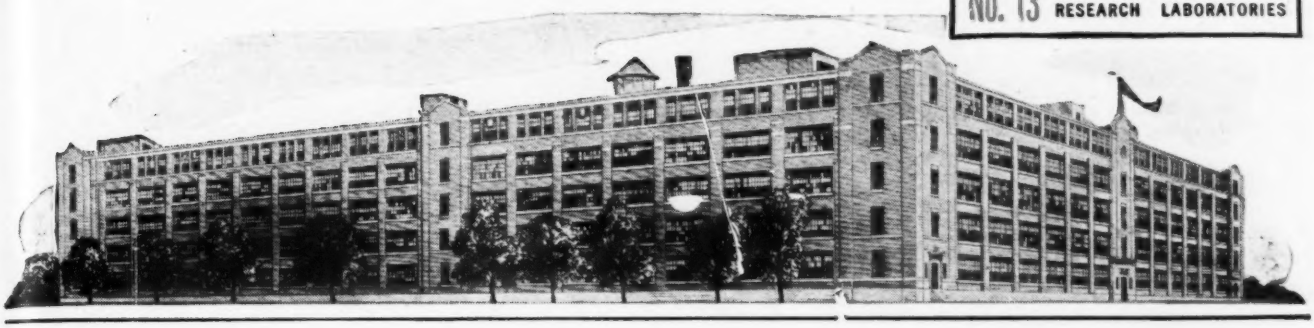
When and if you decide to establish a plant in the South they will be glad to assist you in any studies you would like to have made of any locality in our service area.

Industrial Development Department

ALABAMA POWER COMPANY

BIRMINGHAM, ALABAMA

No. 13 OF A SERIES FROM CYANAMID RESEARCH LABORATORIES



A New Nitrogen Intermediate

AERO* DITHIOBIURET

$$H_2N\text{-}\overset{S}{\overset{\|}{C}}\text{-}NH\text{-}\overset{S}{\overset{\|}{C}}\text{-}NH_2$$

AERO Dithiobiuret is a practically colorless, needle-like crystalline material, which melts between 188° and 193° C. corrected. It is readily soluble in acetone, a bit less soluble in alcohols, dioxane and pyridines, slightly soluble in cold water, moderately soluble in hot water.

It reacts, for example with chloroacetone to form a substituted thiazole. Dithiobiuret can also be alkylated with such agents as benzyl chloride or dimethyl sulfate to yield S-substituted compounds. It will form dimethylol Dithiobiuret with formaldehyde or produce trithiocyanuric acid when reacted with carbon disulfide.

Dithiobiuret of at least 95% purity is now available in research quantities from our pilot plant. Appearing in the literature for the first time in 1945, its chemistry is still relatively unexplored. However, the application of such similar materials as urea, biuret and thiourea immediately suggest many and varied potential uses in the fields of plastics, pharmaceuticals, surface active agents and dyes —as well as for general synthetic work.

Samples are available, as well as more detailed technical information, from Section ON, Synthetic Organic Chemicals Department, American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York.

Other Organic Nitrogen Chemicals

Acrylonitrile $CH_2=CH\text{-}CN$

Guanidine compounds $H_2N\text{-}\overset{NH}{\overset{\|}{C}}\text{-}NH_2$

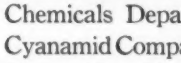
Guanylurea sulfate $(H_2N\text{-}C(:NH)\text{-}NH\text{-}C(:O)\text{-}NH_2)_2 \cdot H_2SO_4$

Lactonitrile $CH_3\text{-}CHOH\text{-}CN$

Dicyandiamide $H_2N\text{-}C(:NH)NHCN$

Ethylene cyanohydrin $HO\text{-}CH_2\text{-}CH_2\text{-}CN$

Phenyl biguanide hydrochloride



*Reg. U. S. Pat. Off.

AMERICAN Cyanamid COMPANY
Industrial Chemicals Division

Headquarters For Nitrogen Chemicals

SAMPLES AND TECHNICAL DATA

American Cyanamid Company
Section ON, Synthetic Organic Chemicals Dept.
30 Rockefeller Plaza, New York 20, N. Y.

Gentlemen:

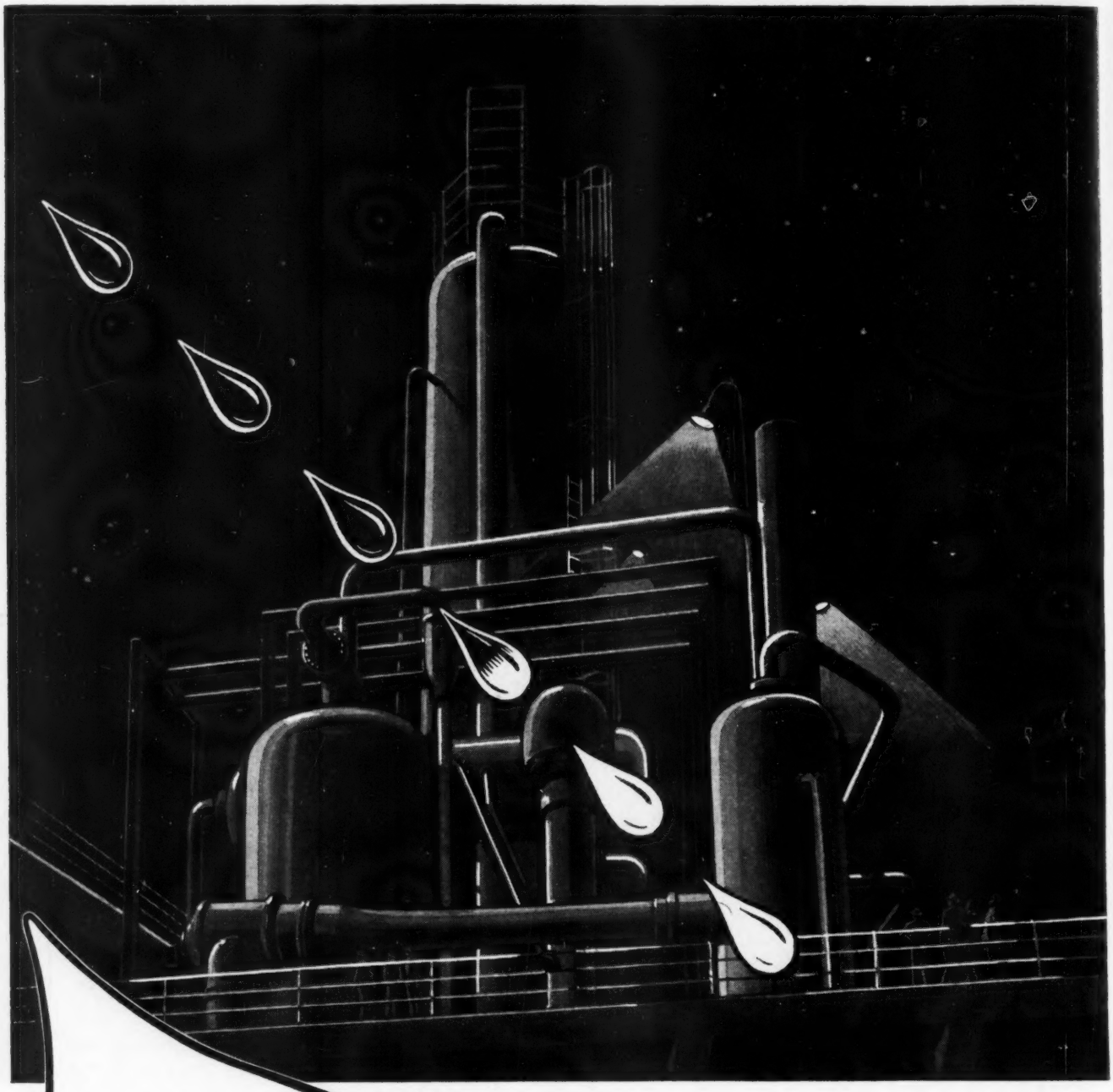
☐ *Send me samples of Aero Dithiobiuret* ☐ *Send technical data sheet*

*Name*_____

*Position*_____

*Company*_____

*Address*_____



Fractionated Pure Fatty Acids

NEO-FAT 7 = $C_8H_{16}O_2$ Caprylic Acid
NEO-FAT 15 = $C_{10}H_{20}O_2$ Capric Acid
NEO-FAT 11 = $C_{12}H_{24}O_2$ Lauric Acid
NEO-FAT 13 = $C_{14}H_{28}O_2$ Myristic Acid
NEO-FAT 1-56 = $C_{16}H_{32}O_2$ Palmitic Acid
NEO-FAT 1-65 = $C_{18}H_{36}O_2$ Stearic Adid

Other Fractionated Fatty Acids

NEO-FAT 17 = Mixed C-22 Unsaturated Acids
NEO-FAT 19 = Mixed C-20 Unsaturated Acids
NEO-FAT 3-R = 60% Linoleic Acid
NEO-FAT D-142 = Oleic-Linoleic Acids

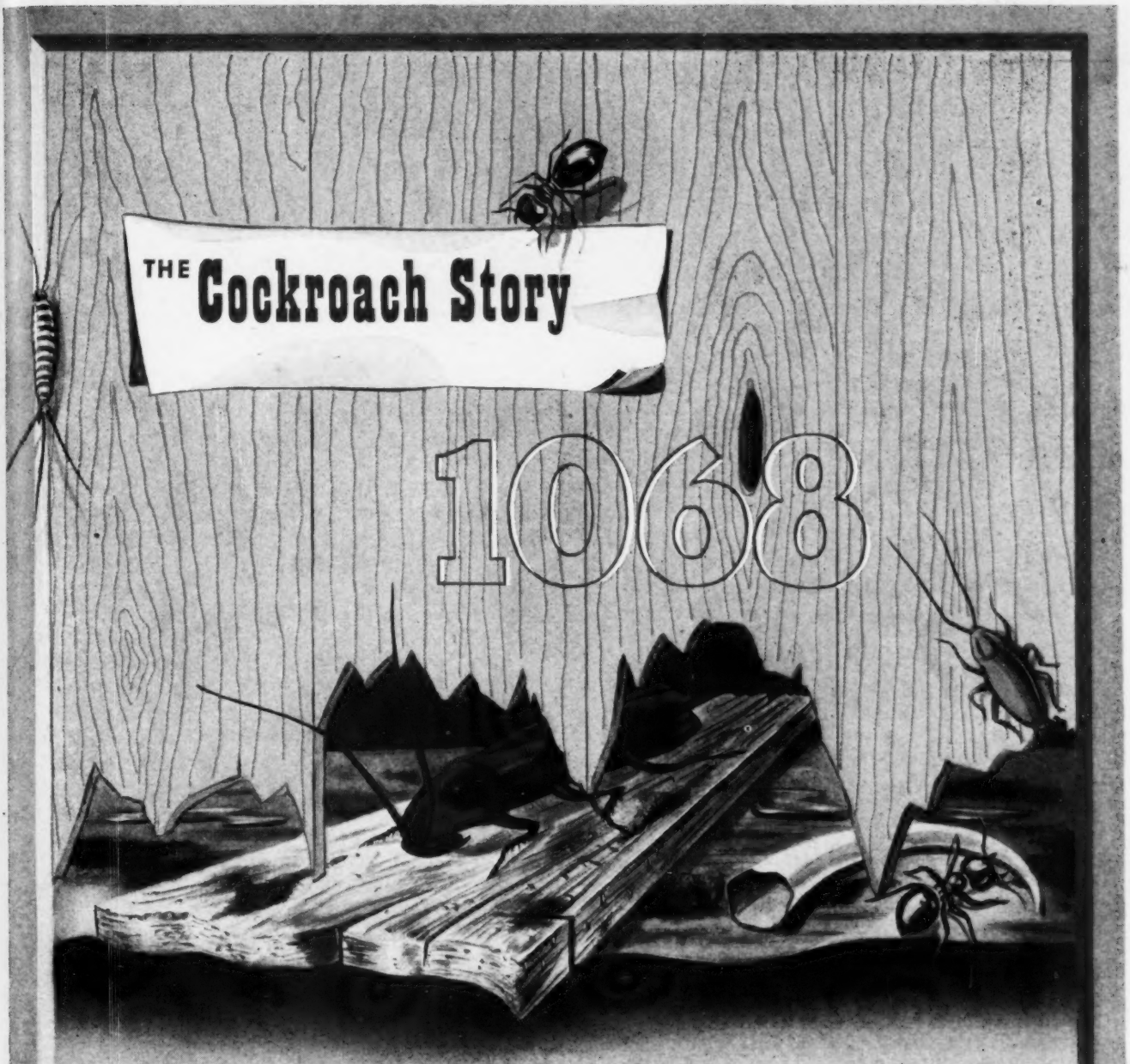
ARMOUR AND COMPANY, 1355 WEST 31ST ST., CHICAGO 9, ILLINOIS

FROM ARMOUR'S NEO-FATS . . . NEW AND BETTER PRODUCTS

Many new and improved products and processes owe their being to the purity and uniformity of the Neo-Fat Pure Fatty Acids...a purity and uniformity made possible by fractional distillation, an exclusive Armour process for separating crude mixed fatty acids into their component pure acids—or into special mixtures for specific requirements. These Neo-Fats—and the nitriles, amines, amides and synthetic oils produced from them—are serving industry today in such diverse applications as protective coatings...rubber products...wax compounds...soaps...cosmetics...chemical intermediates...reagents...lubricants...flotation.

May we recommend the Neo-Fat or derivative best suited to your particular needs?

ARMOUR CHEMICAL DIVISION



Oldest and most persistent of the insects, the cockroach began life early in the Paleozoic Age. The dinosaur, the pterodactyl, and the mastodon have fallen by the wayside, but the cockroach has survived. So well has it adapted itself by its hide-and-seek psychology to changing environments that today this nocturnal prowler, filthy and fetid, has become a major sanitation problem to large sections of our industrial and institutional life, as well as to our householders.

Now, thanks to VELSICOL 1068, the cockroach story which began back in early geologic time, ends, for all practical purposes, in the fourth decade of the Twentieth Century. From 3 to 5 times more effective than DDT in the control of roaches and a wide variety of other crawling insects, VELSICOL 1068 is the ideal toxicant for the formulation of insecticides that act quickly, safely, efficiently. In addition to the roach, VELSICOL 1068 is equally effective against carpet beetles, ants, the bedbug, silverfish and many other species of insects.

VELSICOL 1068 is available as a 20% concentrate in highly refined kerosene, and as 1068 Technical Grade, 90% purity.

You may obtain samples on request. Your inquiries will receive the attention of an experienced technical staff.

VELSICOL 1068 . . . A New Era in Insect Control.

VELSICOL Corporation

Manufacturers of Insect Toxicants • Synthetic Resins • Coresin Core Oils • Aromatic Solvents

General Offices: 120 East Pearson St. • Chicago 11, Illinois

Branch Offices: New York, Detroit, Cleveland, San Francisco, Los Angeles. In Canada: Natural Products Corp., Montreal 2

"Possibly, Nuchar Activated Carbon is the Answer"

If you have a purification problem that "stumps" you, why not call on Nuchar Technicians for their opinion and recommendations. Individual purification problems are continually being studied in our research laboratory which is available at all times for consultation and collaboration.

They'll tell you frankly, first, whether Nuchar Activated Carbon will do the "clean up" job for you . . . profitably. After determining this, they'll select a grade of carbon which will do this work at the lowest cost.

Write for complete information today, stating your special conditions to assist us in determining the best grade for your use. A generous laboratory sample will be gladly sent on request.

Industrial Chemical Sales, Division West Virginia Pulp & Paper Company, 230 Park Avenue, New York 17, N. Y.

Please send me a copy of "Nuchar Active Carbon—purification by adsorption."

Name .....

Company .....

Address .....

City .....

Nuchar
ACTIVATED CARBON
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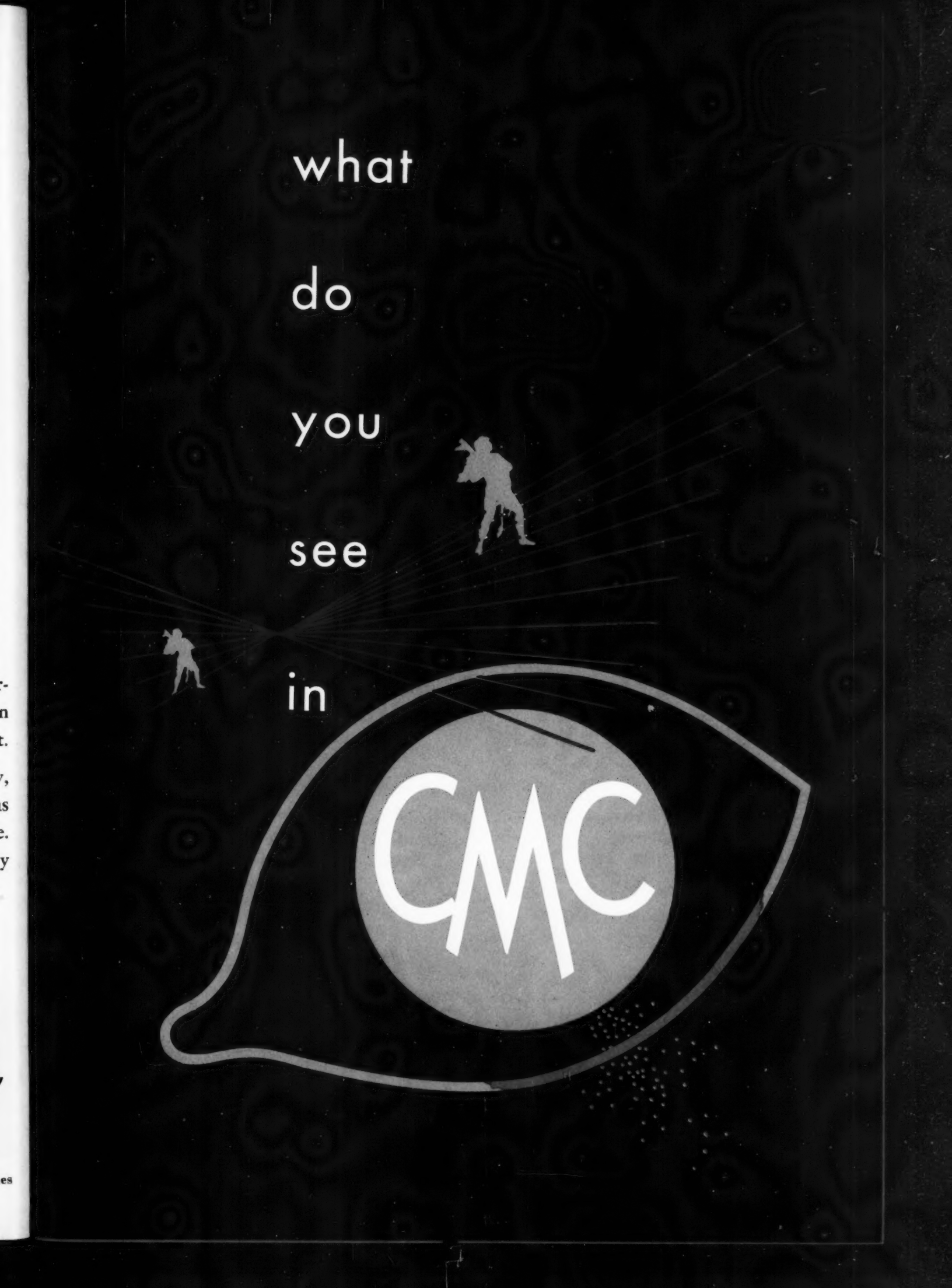
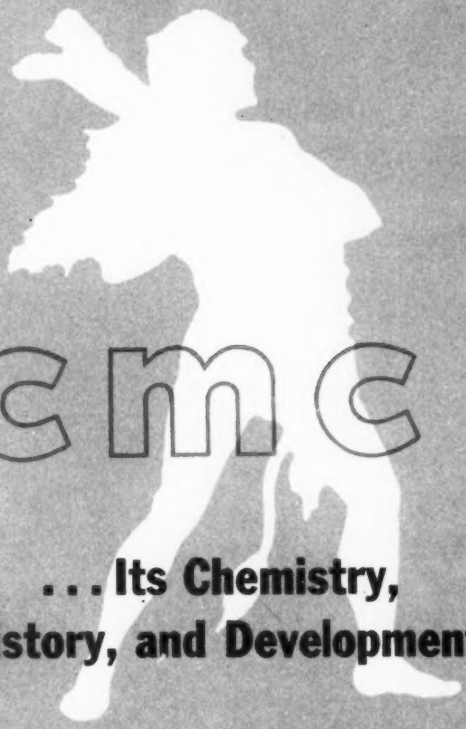

what
do
you
see
in
CMC



cmc

. . . Its Chemistry, History, and Development

Hercules* CMC is the sodium salt of carboxymethylcellulose, formed by the reaction of monochloroacetic acid with alkali cellulose. In application, it is a water-soluble cellulose gum.

Although this cellulose gum has been known to European chemists for many years as sodium cellulose glycolate, little of it has been made in the United States until recently. Hercules began extensive tests and pilot-plant manufacture of CMC in 1944, and now has built a large, full-scale plant in Hopewell, Virginia, for its commercial manufacture.

CMC possesses many properties of water soluble starches, gelatins, and gums, as well as the additional qualities found in processed or synthesized hydrophillic colloids. Unlike many chemicals whose uses are circumscribed by specific property limitations, the applications of cellulose gum continue to multiply as chemists study its unique combination of properties and discover new uses for them.

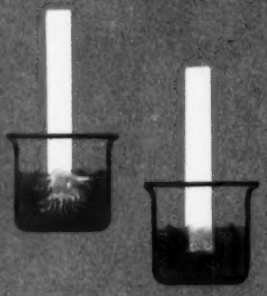
Hercules believes CMC to be an exciting challenge to the ingenuity and imagination of chemists and technicians in many industries. We invite you to study the interesting properties of CMC, described at right. Perhaps you will find some new application of this versatile cellulose gum that will effect an improvement in your product, or a short-cut in your processing.

HERCULES

*REG. U. S. PAT. OFF. BY HERCULES POWDER COMPANY
COPYRIGHT 1946 BY HERCULES POWDER COMPANY

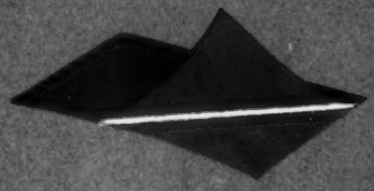
properties

WATER-SOLUBLE, YET CAN BE MADE INSOLUBLE



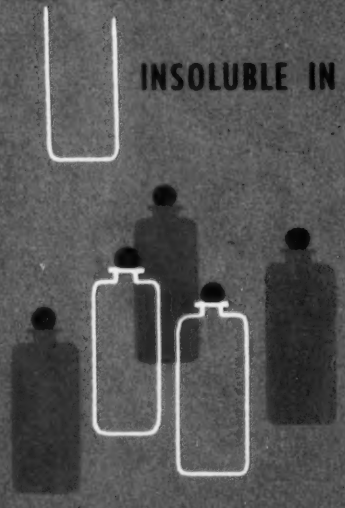
CMC dissolves instantly in hot or cold water. However, if it is treated with a salt solution of aluminum, iron, tin, or similar amphoteric multivalent metals, the sodium in CMC is displaced, and a new insoluble film is produced.

ADHESIVE—BUT NOT STICKY



Although CMC in solution is an excellent adhesive or binder, it can be used — in its dry state — as an anti-stick compound. Even when used as an adhesive, it is speedily "unstuck" upon being sprayed with water.

INSOLUBLE IN ORGANIC SOLVENTS



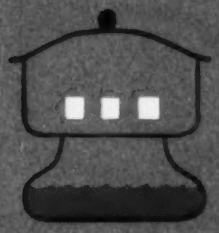
Films of CMC will remain intact, while immersed in such common solvents as corn oil, peanut oil, mineral oil, acetone, turpentine, gasoline, ethyl acetate, ethyl alcohol, carbon tetrachloride, and benzene.

that suggest 1001 uses

FORMS TOUGH FILMS

Solutions of CMC can be evaporated to form films that compare favorably with those laid down by other water-soluble gums. Ultra-violet light has no appreciable embrittlement or discoloring effect on CMC films.

HOLDS WATER—YET ABSORBS NO MOISTURE



CMC is relatively non-hygroscopic. For example it may be used to retain a desired amount of moisture in a given substance, yet will resist further moisture absorption.

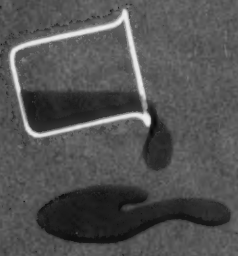
EMULSION STABILIZER

CMC not only acts as an emulsifying agent in oil-in-water emulsions, but it also protects the emulsion. Its stabilizing effect is important in pigmented emulsions, where it serves to keep the pigment in suspension.

READILY COMPATIBLE

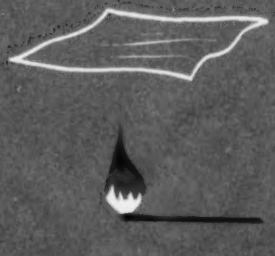
Both in solution and film, CMC is compatible with many water-soluble materials such as gums, plasticizers, and resins.

INCREASES, CONTROLS VISCOSITY OF WATER

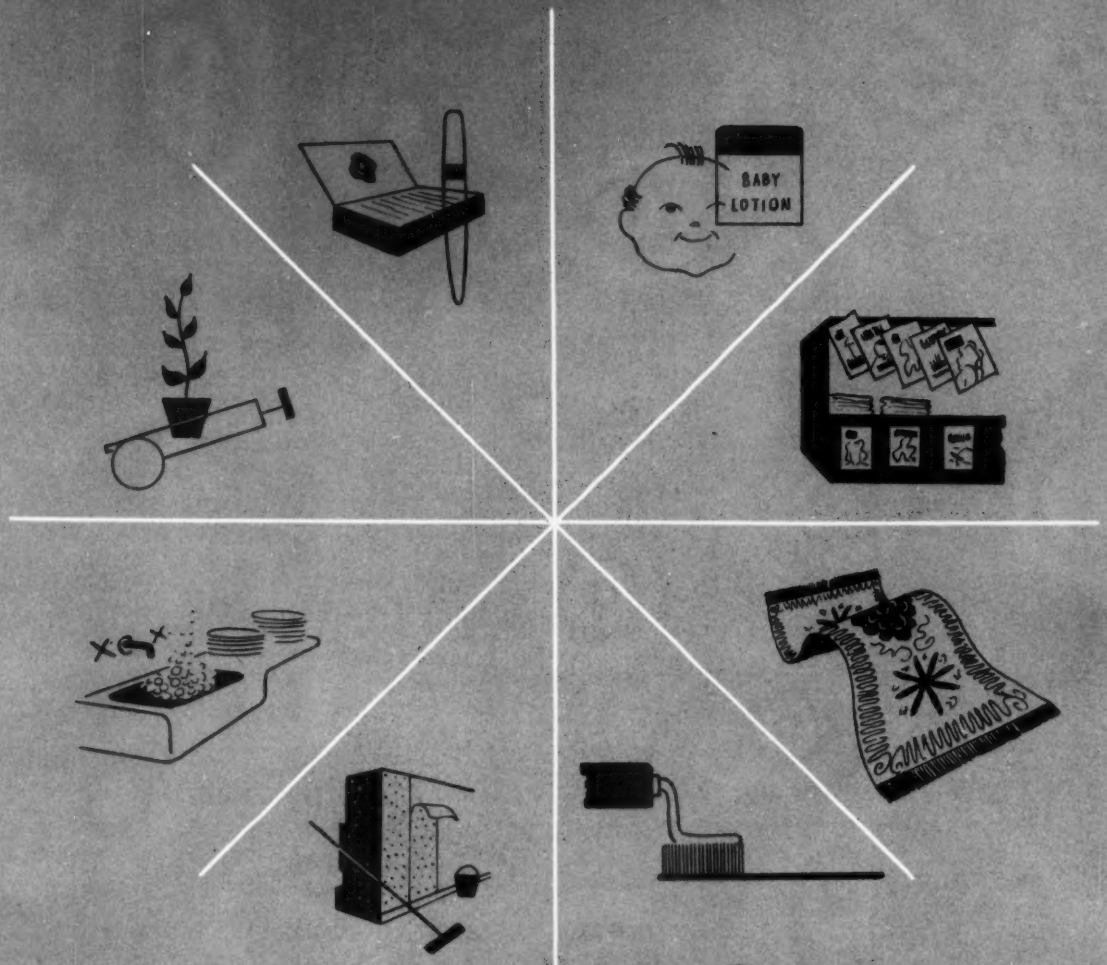


CMC greatly increases the viscosity of water. The low, medium, and high viscosity types in which CMC is supplied—plus the degree of dilution used—makes it possible to carefully control the viscosity of any solution in which CMC is used.

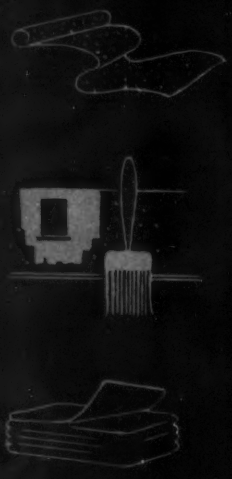
LOW FLAMMABILITY



CMC presents no fire hazard. As it chars only at temperatures above 235° C. CMC is safe to work with at high temperatures.



HOW CAN YOU USE CMC



CMC's ability to increase and control the viscosity of water, plus excellent film-forming properties, have resulted in several applications. For example, in textile manufacture it is used in sizes and finishes, as well as for printing pastes, where it is added to the color box.

CMC is also used in ointment bases, in the thickening of rubber latex, in can-sealing compounds, and for grease-proof coatings for heavy-stock papers and paperboards.

As an emulsion stabilizing or suspending agent, CMC is extremely useful in lotions and other cosmetics, in tooth paste, and in many types of oil-in-water emulsions.

Its stabilizing and film-forming properties make it ideal for use in emulsion paints and lacquers where it also aids in pigment dispersion.

While CMC is not solely an adhesive, it can give adhesive or binding properties for special purposes. For instance, in leather pasting or in the preparation of ceramic glazes, where a modified adhesive is needed, CMC provides the required adhesion, yet is easily washed off.

In crayons and lead pencils, CMC acts as a flexible binder that reduces breakage. It is also used in book binding and for other similar modified adhesive applications.

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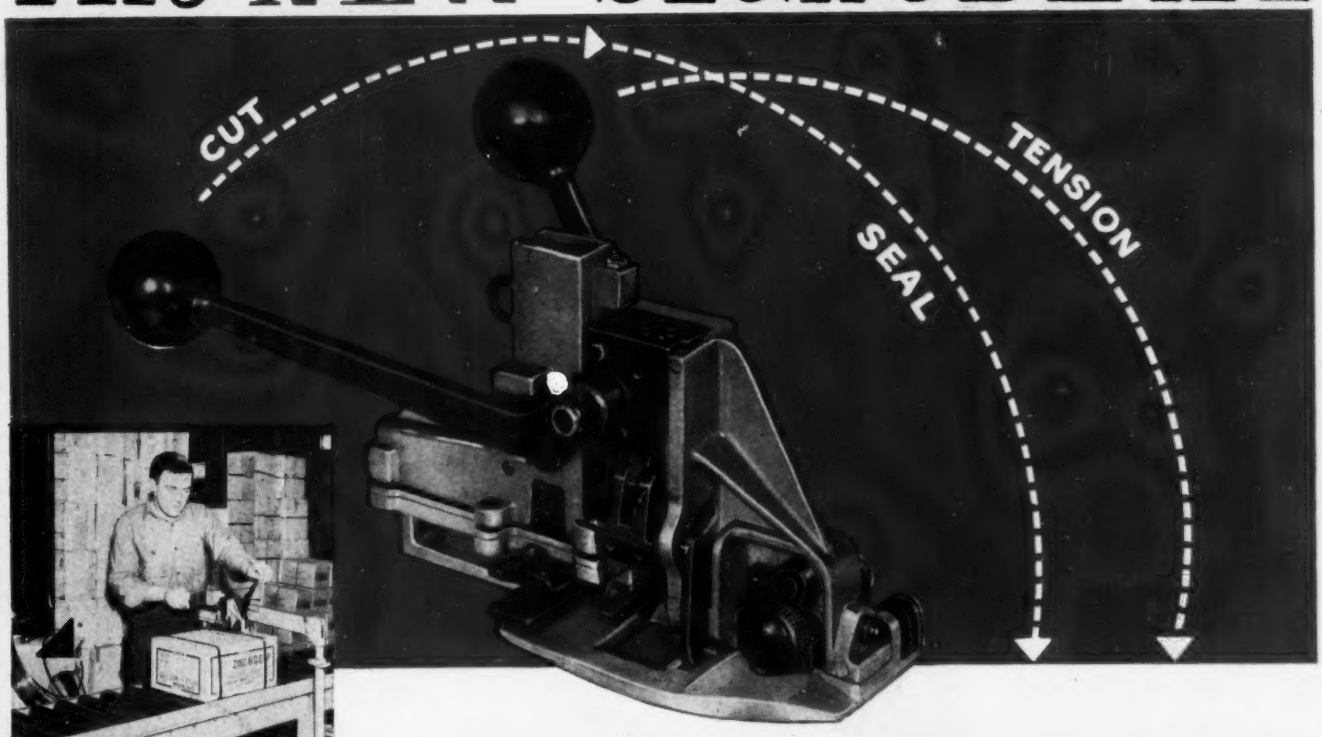
Cellulose Products Department *HERCULES POWDER COMPANY* 1926 Delaware Trust Bldg., Wilmington 99, Del.

INCORPORATED

The NEW SIGNODE A-2



Packing glass jars moving on conveyor system. A-2 is equipped with tool mount.

for FAST STRAPPING

In this shipping room, machine parts are boxed and strapped with A-2 unmounted.

Here, stove pipe elbows are bundled with an A-2. Note: the tool mount makes this strapping operation an easy one.

1 TENSION 2 CUT 3 SEAL

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In every type of production packaging, this new Signoae tool sets all-time strapping records. It's unexcelled for fast, low-cost applications—particularly on centralized or conveyor systems.

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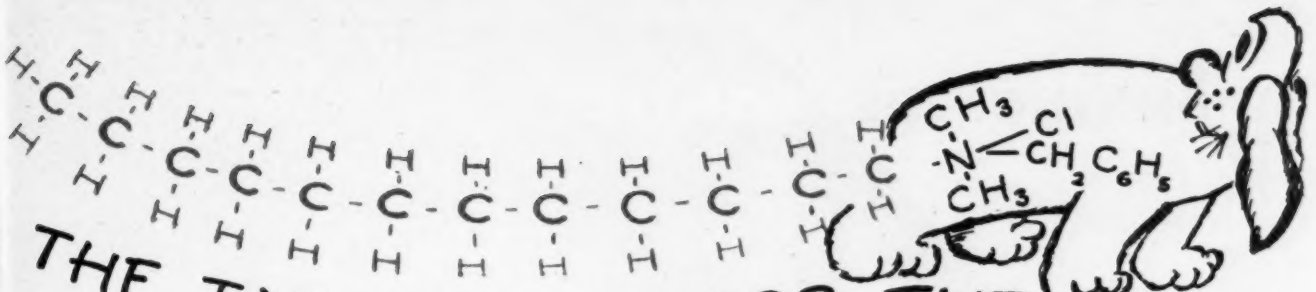

THE long alkyl radical pictured above provides the high surface activity, fast wetting action and deep penetration which insures effective contact with micro-organisms and adds so much to the speedy action and dependability of

ONYX CATIONIC GERMICIDE

Alkyl Dimethyl Benzyl Ammonium Chloride 50%

THE formula shown typifies this unusual germicide. The alkyl radical is controlled by careful fractionation during manufacture so that the average alkyl group in the compound is $C_{12}H_{25}$. It is with this average that the most desirable killing action on bacteria and fungi is obtained in this type of quaternary ammonium compound.

Onyx Cationic Surface Active Germicide is sold at 50% concentration, ready for aqueous dilution by disinfectant manufacturers to produce a distinctly superior germicide for wide general use.

AT USE DILUTION

Ordinarily diluted to make a 10% solution, Onyx Cationic Germicide gives a remarkably safe, effective bactericide and fungicide for all sanitization purposes, including general disinfection, sanitization of food handling equipment and eating utensils, control of slime and algae, cold disinfection and storage of surgical instruments, inhibition of bacterial growth in rinse waters, sanitary control in dairies and milk barns, etc.

- Odorless
- Colorless
- Stable
- Non-Corrosive
- Fast Killing Action
- Non-Selective
- Non-Irritating
- Low in Toxicity
- Deodorizing
- Chemically and Bacteriologically Controlled

Fast Killing Action – A 1-20,000 dilution of active material requires 10 minutes for a 100% kill on Staph. Aureus, but will kill 70% in *one* minute. A 1-5,000 dilution will kill 99.5% in one minute.

Bacteriostasis – Onyx Cationic Germicide is highly effective in inhibiting bacterial growth. Surfaces wet with its solutions are rendered bacteriostatic.

Low Toxicity – The normal concentration for effective sanitization (1-20,000 of active material) is far below that required to produce any toxic effects. For all practical purposes these solutions are non-toxic.

No Skin Irritation – Even a 1-1,000 dilution of active material does not cause skin irritation or sensitization.

Onyx Cationic Surface Active Germicide deserves careful investigation as a potentially profitable item in your line.

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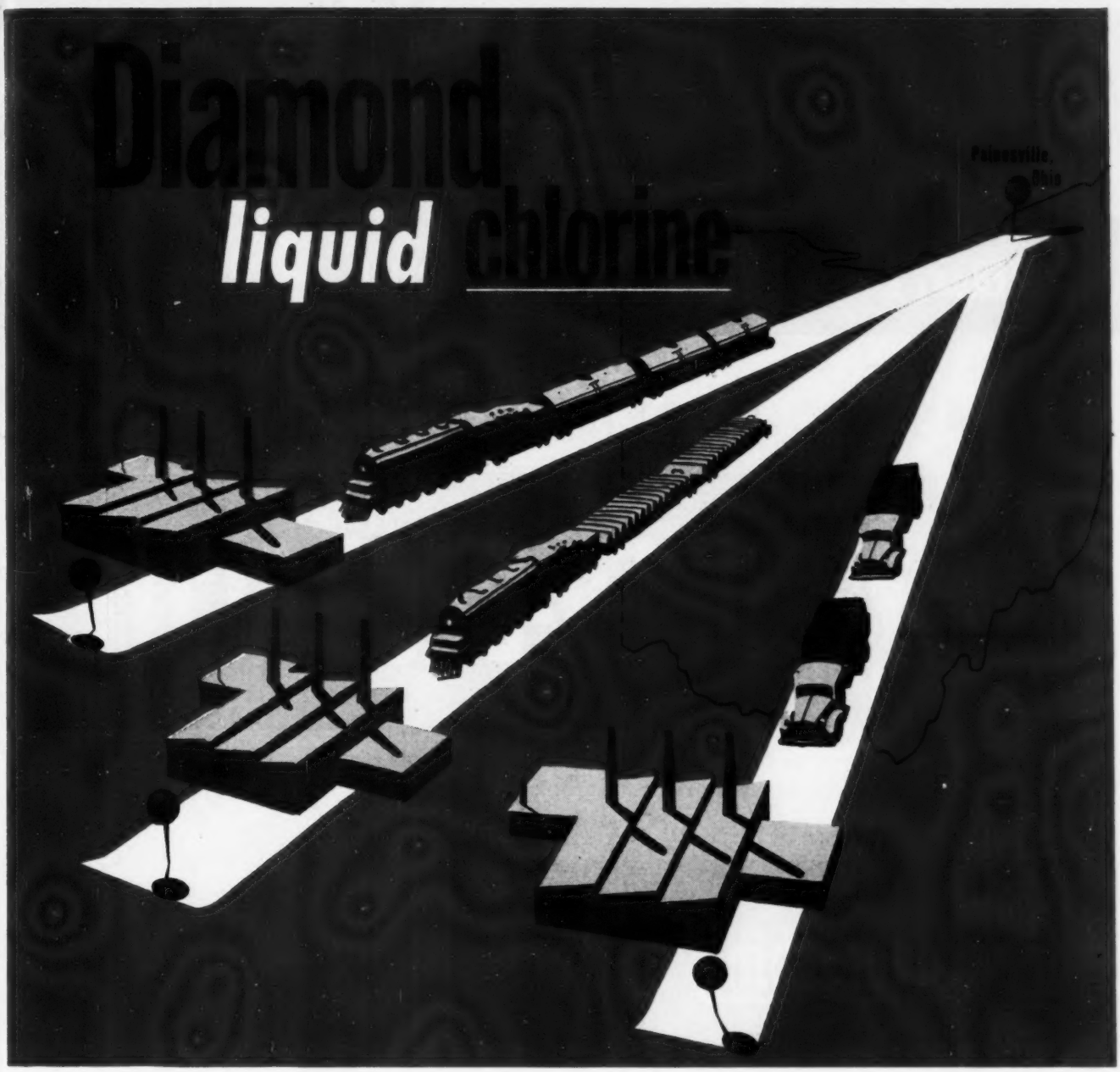

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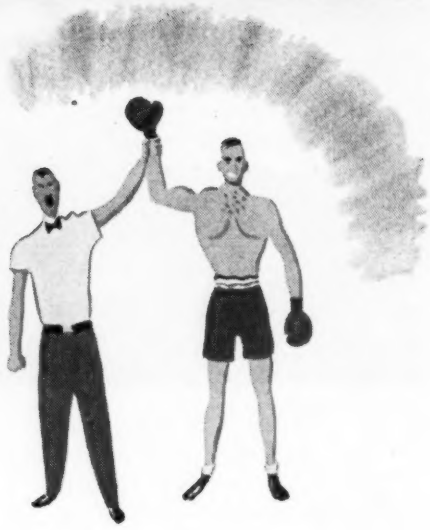

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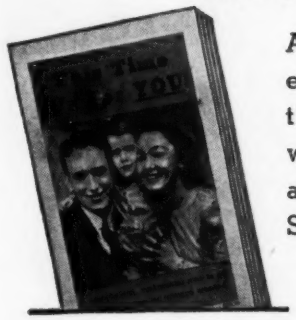

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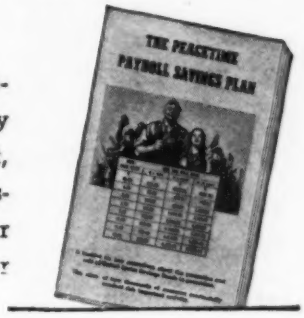
THE PEACETIME PAYROLL SAVINGS PLAN—

A booklet, published for key executives by the Treasury Department, containing helpful suggestions on the conduct of your payroll savings plan for U.S. Savings Bonds.



Are You Using These Booklets?

If you're not already using these helps to a healthy future, get in touch with your State Director of the Treasury Department Savings Bonds Division. And by all means keep up your payroll savings plan. It's a powerful weapon for the maintenance of a strong, secure economy — today and tomorrow!

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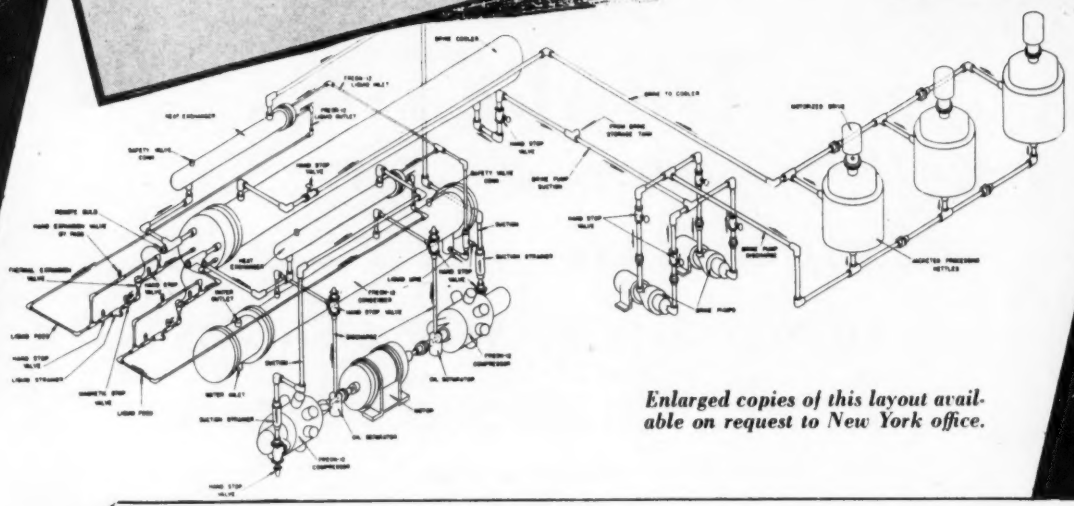

Enlarged copies of this layout available on request to New York office.

This cooling system, using Freon 12 for chilling calcium chloride brine which in turn chills the contents of the kettles, is indicative of the way Patterson-Kelley engineers can help process plants make effective use of heat-transfer equipment. With 3 Jacketed Kettles, a Cooler, a Condenser, and 2 Heat Exchangers of our design and manufacture, it comes close to being an all-Patterson-Kelley installation.

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EST. 1880

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The Ultra-Sonorator, the first laboratory model supersonic generator, is a valuable scientific instrument which opens an entirely new field of research. The science of supersonics is relatively unexplored and its application is a challenge to modern scientists.

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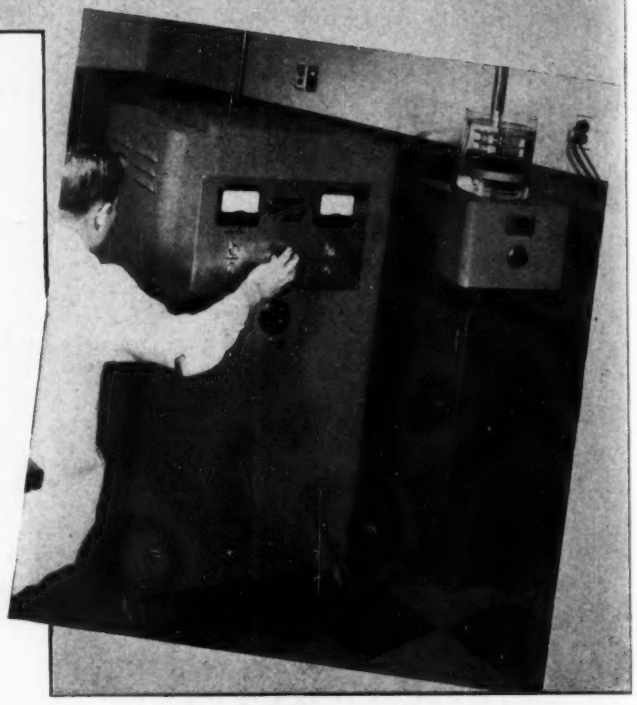
Read the following list of changes effected by supersonics and if you visualize a possible application to your particular field, write for further information.



The Ultra-Sonorator has been engineered for simplified operation.

Some of the Startling Changes Effected by Supersonics:

Physical

Dispersion of soil samples.
Emulsification of immiscible liquids.
Dispersion of metallic elements or fusible alloys in water, alcohol and oil.
Coagulation of precipitates in liquids.
Agglomeration of smoke and dust particles.
Colloidal suspension of solids in liquids.
Degassing of liquids.
Precipitation of ammonium chloride fogs.
Production of stable photographic solutions.

Chemical

Oxidation reaction of potassium iodide to free iodine.
Oxidation of water-soluble dyes.
Rapid hydrolysis of dimethyl sulphate.
Reduction action on compounds such as mercuric chloride.
Oxidation of water to hydrogen peroxide.

Biological

Accelerating and stimulating germination in agriculture.
Reproduction loss in yeast cells.
Loss of luminosity of luminous bacteria.
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Phosphoric Acid
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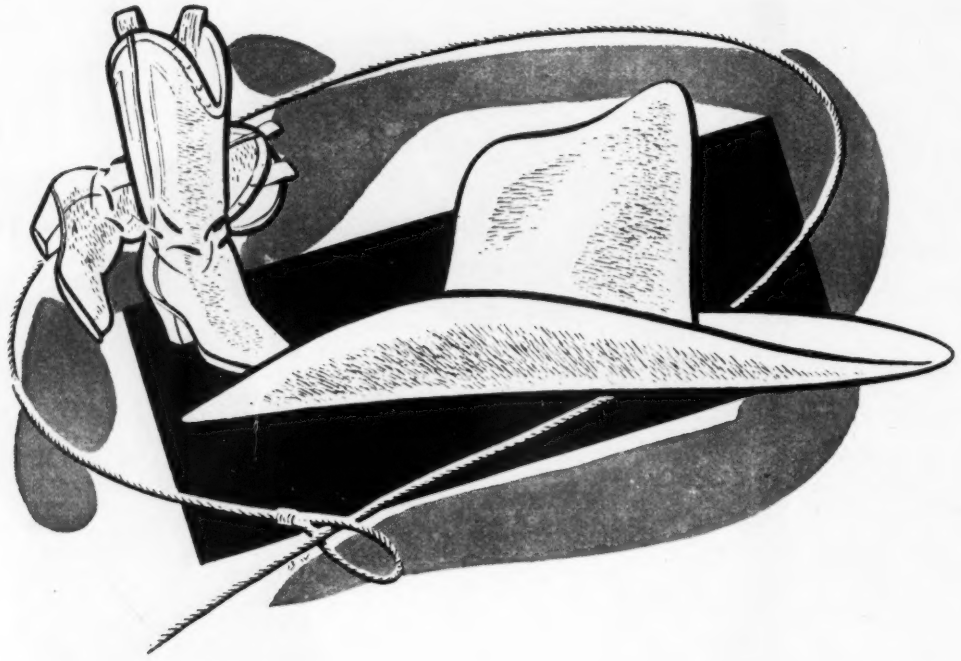

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THE LAW OF THE MAXIMUM

by ROBERT L. TAYLOR, editor

FOR OUR EDITORIAL COMMENT THIS MONTH we draw upon the past. History teaches many lessons, and we recommend to all of our readers the following passage from a chapter in the history of another great nation. It highlights a problem which we believe transcends in importance any other problem facing America or the American chemical industry today. It is entitled "The Law of the Maximum":

The tragic collapse of public and private prosperity in France at the close of the eighteenth century is familiar to any student of the period. Historians of the times invariably point to the excessive issuance of paper money secured by the confiscated lands of emigrants, royalty, and the church as the basic cause for this economic disaster.

Closer inspection of the period, however, reveals it to be one in which many economic experiments were attempted by the "planners" of the French socialistic revolutionists in an effort to meet the difficulties which arose not only as a result of a cheap currency but also because of diminished production consequent upon the interruptions of industry and general disorder due to the War of Revolution.

One of the most important and disastrous of these experiments was the attempt to fix a maximum beyond which the prices of the necessities of life could not advance.

In 1793 the law of the maximum was enacted with the sponsorship of St. Just the Terrorist, associate of Robespierre. Prices were established for grain, meat, fuel, clothing, vegetables, tobacco, beer, and many kinds of raw materials—in all, about 39 items. Though high-handed, this was not careless legislation, and its enactment was preceded by studies by committees of experts who reviewed distribution systems, commodity supplies, and consumer demands. A base period was selected (1790) and the price for each necessity controlled was established at one and one-third of its price in that year.

To the base price was added an allowance for transportation and fixed wholesale and retail mark-ups. The new law was reported to the people with great fanfare. Barrere, a great orator of the Revolutionists, said, "Monarchial commerce . . . sought only wealth," while France, to revive, needed "Republican commerce—a commerce of moderate profits and virtuous. France alone enjoys such a commerce."

Immediately upon the announcement of the law it was violated and scarcities increased. Tickets were issued to the people to entitle them to buy necessities at official prices. This was followed by increasingly stringent penalties in an effort to support the law—to prevent private sales and hoarding. Finally a death-penalty law was passed to punish those who possessed stocks of the controlled commodities and refused to sell them at the legal price and on the daily guillotine lists of 1793-94 appear the names of violators of the law of the maximum.

In spite of all the evasions, the law brought agriculture, manufacturing, and commerce practically to a standstill. Farmers and peasants soon produced little more than sufficed for their own consumption. Hardly anything was produced for sale. Many crops remained unharvested; factories were closed; fishermen refused to go to sea. People would not work if they saw no chance of getting remunerative prices for their produce. Many people were imprisoned for the crime of refusing to pursue trades in which they were not allowed to make profits, or of selling at prices which purchasers were glad to pay, but, which were often 200 per cent above legal maximum.

Frightful distress followed, especially in cities and other areas where people could not produce sufficient food supplies for their own support.

Many were crushed in the scramble at the bakers' shops. Many, especially the children, were literally starved. After the fall of Robespierre (July 1794) the law was openly broken. Fortunately, it had neglected to take into cognizance live cattle and sheep, and, consequently, though bread was scarce, meat became tolerably plentiful when it could be sold at a fair price. Agriculture and manufacturing began to revive, especially after the maximum law had been formally repealed (December 1794).

Government controls are bringing industry and commerce to a standstill in America today. New scarcities are being created every week and others are being prolonged. Marginal producers are being forced into idleness because they cannot make a profit under existing ceilings. Black markets are flourishing in such necessities as food and housing—yes, and in scarce chemicals and drugs, products of our own industry—enriching the unscrupulous while honest producers are operating at a loss.

It is high time some of the leaders of this nation got back to the realization that there is still such a thing as the law of supply and demand, and that it doesn't stop working just because somebody draws up a plan. If we act quickly, there is still time to avert the catastrophe toward which we are now heading.

Research Pays Off Again

CONCRETE EXAMPLES OF HOW research contributes to chemical sales and profits continue to come along. The latest and one of the most striking is brought out in the recently issued 1945-46 report of the Pennsylvania Salt Manufacturing Co.

In 1946, the company states, 57 per cent of its total net earnings were from products that did not exist in the company's line in 1929. Since 1946 earnings just about equalled the 1929 peak, it can therefore be assumed that without research total earnings would now be but 43 per cent of 1929.

Moreover, with but one exception, the proportion of total earnings attributable to new products has increased every year since 1932, regardless of whether total earnings were heading up or down.

This is a record for research that is hard to refute. —RLT.

Why Take Chances With Trademarks?

THE CHEMICAL INDUSTRY HAS LONG been patent conscious. Both individuals and corporations have sought and utilized every means available to protect the fruits of their research. Blanket coverage has been the rule wherever possible—process, product, and use patents. But, strangely enough, many concerns which so cherish patent protection seem to lack a true appreciation of the worth of trademarks. Open any newspaper and you can read of bitterly defended patent suits. Flip through the pages of any magazine and you will find many flagrant violations of the simple basic regulations of trademark preservation. Yet tradenames, dollar-wise, are often more valuable than patents.

The passing of the Lanham Act—which will come into force next July—offers manufacturers a greater degree of trademark protection than has ever been accorded before. The selection and filing of a defensible tradename will be much easier than hitherto, as a result of the establishment of a central, up-to-date registry of trademarks. Other provisions of the Act are contributory to broader coverage. But the fundamental law remains the same. The onus for the preservation of the exclusive character of a brandname remains on the owner. Neglect of a few cardinal principles can invalidate a good 1947 trademark just as easily as is the case under the present Act.

What are the main pitfalls? How have many trademarks degenerated to become public property? What has protected Kodak, Koroseal, Vaseline, and destroyed cellophane, brilliantine, aspirin, milk of magnesia, and linoleum?

Permitting your tradename to become a generic term—that is, so that it no longer appears to represent a product made only by one concern but instead comes to represent a type or class—is one of the ways to lose an exclusive tradename. (The classic case in this respect is cellophane—Judge Augustus Hand, 1936) Employment of a tradename as an adjective, verb, or common noun likewise constitutes generic use.

Too, on a patented article a manufacturer may fail to acquaint consumers with another name for his product; when the patent expires the trademark often becomes public property (e. g. aspirin). Or the original owner may allow competitors to use his trademark so that the public no longer associates it solely with the original producer (e. g. milk of magnesia).

One of the factors which a chemical producer must consider most seriously at present is the careless use of *his* tradename by customers in *their* advertising. Makers of synthetic detergents, plastics, and toxicants for insecticides are particularly vulnerable and the status of their trademarks can be easily jeopardized in this fashion.

Other cardinal rules dictate an insistence on the capitalization of all brandnames, and the inclusion in all advertising and labelling of an asterisk affixed to the trademark with a footnote, "Reg. U. S. Patent Office."

Violation of these points can mean the loss of a valuable trademark. A thorough study of the Lanham Act is recommended, together with strict observance of the basic principles of trademark protection.—WAJ.

What Pilot Plants Are For

RECENTLY A FRIEND, a chemical engineer charged with supervision of the design, construction and operation of pilot plants for a major chemical firm, levelled a criticism at research chemists which, though perhaps a bit overrestricted in its target, makes a point worth noting.

One of the principal obstacles to his doing a better job for his company, our friend contended, was the feeling on the part of a large number of the chemists that most of the experimenting on a project was finished with the completion of the laboratory phase of the work. They viewed the purposes of a pilot plant as merely to confirm that the laboratory process could be carried out on a large scale and to provide samples for consumer testing. They failed to comprehend the other equally if not more important pilot plant jobs of providing accurate production cost figures, developing sufficient engineering data to provide an optimum design for the final plant, and training operational and supervisory personnel for the final plant.

Lack of appreciation of the real functions of a pilot plant—whether by chemists, management, or any other group—can result in great loss of time and money. Where there is lack of knowledge of what a pilot plant is for, there is usually pressure on the pilot plant engineers to throw a unit together which will work, regardless of economics and efficiencies. This is usually followed by more pressure at a later date, if the product "clicks," to get it into production immediately, again at the expense of economy and good design.

To get the most out of pilot planting it must be recognized that a process in this stage of development is still in a experimental stage, from the standpoint of both company profits and future competitive position. —HWZ.

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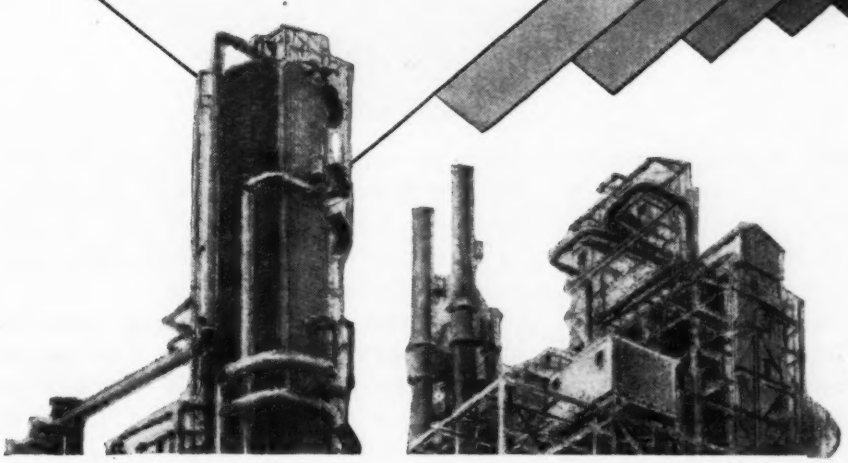
	78°C minimum melting point. Shipped in light wood barrels and tank cars.
Refined	79.4°C minimum melting point. Shipped in bags, light wood barrels and tank cars.



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No. 1 of a series on
MODERN METHODS AND MATERIALS
FOR ADHESIVES MANUFACTURE

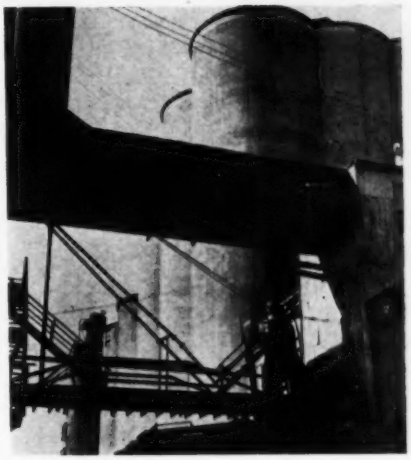
Chemical Industries

OCTOBER, 1946

Chemicals Increase Versatility of STARCH ADHESIVES

by ALEXANDER FRIEDEN*
Director of Research, Pabst Brewing Co.
Milwaukee, Wis.

IN RECENT YEARS the manufacture of adhesives has graduated from a crude rule-of-thumb art to the status of a scientifically controlled chemical process industry. Currently, it represents substantial investment in capital equipment, has an annual output in excess of two billion pounds, and is a major consumer of a wide variety of chemicals. Output of starch-based adhesives accounts for a heavy proportion of the industry's total tonnage, and the trend toward chemical improvement of its products presages further expansion, both as to the quantities consumed and variety of applications.



Courtesy American Maize Products Co.

Adhesive makers draw thousands of tons of cereals from U. S. granaries annually.

This article, dealing exclusively with starch-based adhesives, is the first part of a three-installment feature on adhesives. Subsequent articles on protein-derived products, and synthetic adhesives, will appear in November and December issues.

FOR centuries man has prepared pastes and glues for the purpose of "sticking" things together, whether it was the gum exudation from trees to cement two pieces of bark to make a stouter foot covering, or the use of blood to mix with ochre to form a more lasting paint foundation for the make-up of those days.

But, although it has been known for years that a mixture of flour and water will form an adhesive paste, and that strong wood-bonding glues can be made from bones, fish, etc., the making of specialized glues consisted of secret methods and formulas that were passed from the knowing few to their favorite ones and continued in crude fashion for generations. Even commercial production of adhesives suffered for years from such circumstances, with processes shrouded in secrecy and formulations jealously guarded.

Now, however, adhesive manufacture has attained its proper stature. Output exceeds two billion pounds annually, and is growing steadily. Scientific techniques are widely utilized, both in production processes and in broadening the field of usefulness of its products. In this latter connection numerous chemicals play an important role, as more and more emphasis is placed upon the worth of research and development.

WHAT IS ADHESION?

The factors which cause adhesion are principally of two kinds: specific and mechanical. In specific adhesion the action is chemical and is thought to be caused by the molecular forces operating between the surfaces of the article to be glued and the adhesive film, or between the surfaces across the adhesive layer, or between the surfaces and the interior of the film, or a combination of all three. This means that the range of the molecular attractions must bridge across the film thickness, and that the molecules touching the solid surfaces should become oriented so that, through chain effects or micellar linkages, the "attraction" influence will be extended through the film and onto the surfaces to be glued. It also means that the adhesive forces between the bonded surfaces must be greater than the cohesive forces of the molecules of the adhesive film itself, or the glued article will fail at the glue line when subjected to stress or strain. With the selection of the proper adhesive the failure will always be within the structure of the bonded article and not at the bond.

Mechanical adhesion is, as the name implies, adhesion due to physical effects. It is the "keying" or interlocking effect produced by the penetration of the adhesive into the pores, and the covering by it of all surface irregularities. Mechanical adhesion carries along with it specific adhesion to a greater or lesser degree, depending on the type of adhesive and the kind of surface.

Adsorption is also considered an im-

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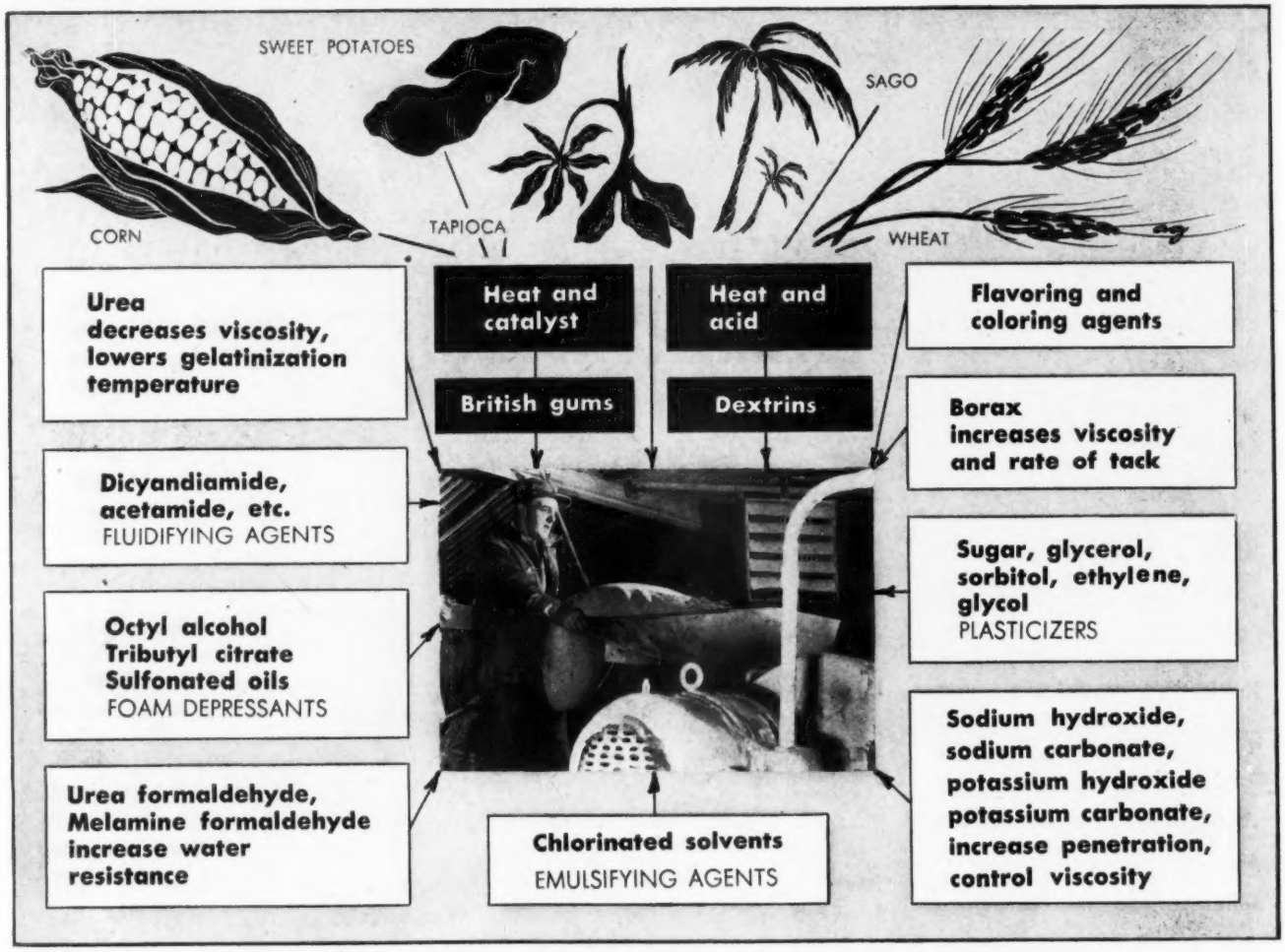
RAW MATERIALS AND CHEMICALS USED IN THE MANUFACTURE OF STARCH ADHESIVES



portant factor in determining the degree of adhesiveness or the adhesive power of a substance. It would be difficult to give adsorption an independent function in determining degree of adhesiveness. It is undoubtedly associated with both specific and mechanical adhesion. The surfaces to be adhered must be wetted by the adhesive. The adhesive film is undoubtedly affected by the primary and secondary chemical forces of the surface molecules. It is an acknowledged fact that good adhesion is difficult to obtain with a non-polar adhesive for a polar surface, and vice-versa. For best results, non-polar adhesives should be used for non-polar surfaces, and polar adhesives for polar surfaces. Wetting of the surfaces to be adhered by the adhesive is a "must".

Other factors of great importance for good performance of an adhesive are the use of thin adhesive films and clean surfaces. An adhesive selected for a wood surface may operate poorly if the wood has an oily or dirt layer. Also, in a thin film we have its chemical forces exerting the greatest range on the surfaces to be glued. If the film is thick, we may encounter the condition mentioned before where the cohesive forces of the molecules of adhesive may not be as strong as the adhesive forces between the surface and the adhesive, and consequently the joint fails through film breakdown.

The following table illustrates the effect of the thickness of the adhesive film on the strength of the bond:

Thickness of adhesive (inches)	*Joint Strength (lbs. per sq. in.)*
Usual (pressed by hand)	2250
0.04	750
0.05	500
0.08	350
0.13	400
0.17	35

Assuming that the correct adhesive is used, that the surfaces to be bonded are clean, and that the right thickness of the adhesive film is applied, the performance may still not be at its optimum unless the proper equipment and the right method of application is used. Among the methods of application are brushing, dipping, spraying, and direct or indirect application of glue through roller, wheel, or knife applicators. The best method should be selected. The condition of the equipment and the layout—such as distance of the gum box from the actual gluing operation in the manufacture of bags, or the length of the drying tunnel in gummed paper, or the length of the "cut-off" in tube winding—are of great importance in maintaining efficient adhesive operation.

TYPES OF ADHESIVES

Flours:

Of the various flours available, wheat and rye have been most used for adhesive purposes. The usefulness of flours as adhesives is due, of course, to their starch content, which constitutes the main ingredient of the flour, but their use on a large scale has given way to the pure starches, which are far superior. Some flour is still used in a few operations, such as in the preparation of bottom gums for bags where machine operation is slow, and in hand pasting. However, by far the largest amount of flour is used as an adhesive along with urea formaldehyde resins in the manufacture of plywood panels. The chief consideration in the use of flours is their low cost and the economy effected in the glue costs through their use. (Rice flour is used by one large paper mill as an adhesive for its coated paper.)

Even though the starch content of flour may be as high as 80% of its weight, the presence of protein and of fibre interferes seriously with the operation of flour as an adhesive on an equivalent basis with starch. The presence of protein causes foaming and lumping when put in solution with water, while the presence of fibre results in an accumulation on the applicator, which causes machine stoppage and faulty adhesion. In the recent shortage of starch, substantial quantities of flour have been used along with starch and also alone for adhesive purposes. In such uses, the foaming and lumping of the protein is

overcome by denaturing it, though it is sometimes necessary to incorporate foam depressants as well. These flour-starch combinations are not as satisfactory as starch alone. In view of the large amount of information that has accumulated over the past twenty years on the technology of flour, it might well be possible to modify flour at the flour mill so as to extend greatly its range of applicability as an adhesive. The flour mills have been surprisingly backward in visualizing these industrial possibilities. Both the miller and the cereal chemist think of flour principally in terms of bakery products.

In use, the flours are handled very much the same way as the starches. That is, they are dispersed in water and heated to gelatinize the starch that is present. Modifying agents are used in the same way as with starch, but certain reservations must be made due to the presence of the non-starchy ingredients.

STARCHES

By far the largest single class of adhesives consists of those using starch or derivatives of starch as the base. Synthetic resins and rubber adhesives have made significant inroads into this older class. Nevertheless, the consumption of starch adhesives will always remain comparatively large. There are many uses for adhesives where water resistance is not required and where quick tack and retack characteristics are necessary. The above, coupled with the fact that starch adhesives are less costly than resins, are odorless, non toxic, and flexible in application assures them wide acceptance by adhesive consumers for a long time to come.

The starches important in the manufacture of adhesives are principally corn and tapioca, and—to a lesser degree—wheat, potato, sago, sweet potato, and waxy corn. The present conception of starch is that it is made up of two types of molecules: amylose and amylopectin. Both types of molecules are polymers of glucose, but the amyloses — which are straight chain molecules—are smaller than the amylopectins, the branched chain molecules. Molecular size may vary from a molecular weight of 10,000 to 60,000 for amylose molecules to from 50,000 to 1,000,000 for amylopectin molecules.

From the point of view of adhesiveness, the amylose fraction in starch is of little significance. It leaches out on heating the starch with water, and when once in solution begins to retrograde rather fast. The amylopectin is the important fraction, for it is responsible for the adhesive properties of starch by forming, when heated with water, gels that are considered to consist of three-dimensional networks.

The characteristics of tapioca starch are such as to make it the most preferred as an adhesive base. With water it forms a gummy hydrogel which does not paste back, is clear, and odorless. There may be some differences of opinion on how the other starches would line up as compared to tapioca for adhesive bases. In the author's opinion, the order would be about as follows:

Tapioca
Sweet potato, sago, waxy maize (potato)
Corn wheat
Potato

(*For some purposes potato is superior to corn or wheat; for others, it is inferior.*)

The order may well be different for dextrins, particularly those highly dextrinized. It is interesting to note that the characteristics of adhesives made from these different starches cannot be explained solely on the basis of the percentage of amylose and amylopectin. Thus, tapioca has 20% amylose, yet it is greatly superior to potato which has 25%. Similarly, corn has about 28% amylose. This extra 8% of amylose for corn would not account for the vast difference in their characteristics. It is obvious that the size of the straight chains and the length of the branched chains exert great influence on the type of hydrogel formed.

Native starch is the pure starch prepared from the grain or root. It is widely used as an adhesive for veneer and plywood where water resistance is not necessary. It is used in the manufacture of corrugated and laminated board and, through enzyme conversions, as a base for many liquid adhesives. Millions of pounds are used in that manner. Native starch is also, of course, used as the base in the manufacture of dextrins and British gums. Thin boiling starches and oxidized or chlorinated starches are two types of modified starches manufactured in large quantities. However, comparatively little of these types is used for adhesive purposes.

DEXTRINS

Dextrin is the generic name applied to the class of starch derivatives made by heating dry starch sprayed with small amounts of acid. The large glucose polymer is broken down into smaller units, principally through hydrolytic scission and fragmentation due to the heat. Numerous smaller units can thus be formed from one large polymer. Assuming that the corn starch molecule has a D. P. (degree of polymerization) of 300 (that is, consisting of 300 glucose units) numerous new units can be formed beginning with 299 glucose units all the way down to maltose and glucose.

Commercially, dextrins are arbitrarily divided into white and canaries. The white dextrins, so called because they are light in color, are the products prepared by using low heat—from 250 to 350 degrees F.—in the dextrinization process. The canary dextrins, which are dark in color, are converted at temperatures of 350 to 450 degrees F. Obviously, the canary dextrins are more highly degenerated and consist of smaller polymers than the whites. This means that they are more highly soluble in cold water and will form viscous dispersions with smaller amounts of water than the whites—a property of great importance for some adhesive applications where the amounts of water used must be kept down to a minimum.

BRITISH GUMS

British Gum is the designation that originally covered starch derivatives made by heating dry starch without the addition of chemical substances such as mineral acids. Recently, however, the practice has been to add small amounts of chemicals in order to speed up conversion and increase production. The chief distinguishing characteristic between dextrin and British gum is that in the manufacture of British gum there is less hydrolytic scission. The resulting product is therefore gummier and more adhesive. British gums, like dextrins, can be prepared in various degrees of polymeric degradation, resulting in products having a wide range in color, solubility, and viscosity. Heat and catalysts are two of the principal factors in varying the types of dextrins and British gums produced by the manufacturers.

In the manufacture of adhesives, it is seldom that dextrins, British gums, or starches are used alone. Generally other substances are added either to improve the adhesive qualities of the base or to impart new characteristics. As an example, when starch is used for veneer, it is necessary to add to the water slurry during cooking chemical agents which will reduce the viscosity of the gel so that a working glue can be prepared without using excessive amounts of water. This latter causes undesirable consequences, the most serious of which is warping of the panels during drying. Cutting agents of this sort are peroxides, perborates, or enzymes. When the thinning action is completed, caustic is added to the cook, which serves to improve the gumminess of the glue as well as to increase the penetration into the wood. Similar modifications of starch while it is being gelatinized are made in many other operations.

Starch without the addition of chemicals is used as an adhesive for some operations. One of the principal uses in this category is as a binder with wood flour in the manufacture of wooden heels, dolls, buttons, etc. Water solutions of dextrins and British gum are used where high concentration of solids is necessary. Thus, for envelope seals, dextrin is used in the concentration of 60% to 65% (on plunger machines). Preferably no chemicals are added, though sometimes it is advisable to add small amounts of plasticizers, and flavoring and coloring materials. Also, for flat gumming (the gum-

ming of sheets which are subsequently cut up into labels on tapes), the pure dextrin or British gum is desirable.

CHEMICAL ADDITIVES

The great majority of amylaceous adhesives, however, do have other materials admixed. Chief in importance of these adjunct materials are borax, sodium hydroxide, sodium carbonate, and urea. Other substances having important functions which are sometimes used in smaller amounts are plasticizers, surface active materials, "fluidifying" agents, and coloring and flavoring substances.

Borax has the unusual property of increasing the viscosity of starch gels and also of making the gel gummier. The chemical action of borax on starch and dextrin is most likely that of coupling through hydrogen bonding between the exposed hydroxyl groups of the starch or dextrin with the borax molecule, as well as the formation of associated molecules. In practice, this effect permits the use of adhesives at higher dilutions, resulting in economy. Thus, a dextrin which has to be made up in a 50% aqueous dispersion in order to perform satisfactorily as an adhesive may readily be made to give equivalent performance in a 25% concentration by the addition of 10% to 15% of borax.

Starch or dextrin aqueous adhesives consist of hydrogels in which most of the water is bound and there is comparatively little free water available. Whatever free water is available acts as a solvent, keeping the hydrogel fluid. When applied to absorptive surfaces, some of the free water is absorbed by the surface and the hydrogel is rendered less fluid. This change from the fluid to the gel stages regulates the rate of tack. Borax increases sensitivity of the adhesive to this change and consequently helps increase the rate of tack and improve speed of production.

Sodium hydroxide as an additive to dextrin or starch adhesives has several functions. When used along with borax, it accentuates the action of the borax. This further increase in viscosity enables the user to reduce the concentration of dextrin solids to a lower point, provided the product is not affected adversely by the higher pH's. Sodium hydroxide also improves penetration and bite into the surfaces to be adhered, thus giving the adhesive better mechanical anchorage. Sodium hydroxide has also been found useful for rosin sized surfaces. Rosin-sized paperboard will resist aqueous adhesives unless the rosin surface is cut into. Caustic will do this by forming the soluble sodium resinate. When caustic is used without borax, an increase in viscosity is obtained where small amounts are used. With larger amounts—over 1%—a lowering of viscosity rather than an increase may result.

Sodium carbonate has an effect similar to that of sodium hydroxide, but of course to a lesser degree. It is used particularly in dry mixtures where the hydroxide is too hygroscopic to be used. Needless to say, potassium hydroxide and potassium carbonate act similarly to the sodium compounds.

Urea has the opposite effect to that of borax. Borax increases the viscosity of starch and dextrin hydrosols or hydrogels, while urea decreases it.

Courtesy American Maize Products Co.
Corn starch tumbles off the drying equipment in a modern starch-extraction unit.

The particular advantage in the use of urea in amylaceous adhesives is that it enables the manufacturer to use gummy products which otherwise could not be used because of the excessive amount of water that would be required to make a workable hydrogel. Thus, gummy British gums can be worked up into excellent adhesives with urea. Without the urea, a more highly degenerated dextrin or British gum would have to be used in order to keep the percentage of water low. The resulting bond would of course be weaker. This principle is taken advantage of in the manufacture of gummed tape using a starch product for the gummed face to replace animal glues.

Other properties imparted by urea when used in combination with starch and dextrin adhesives are a slightly plasticizing effect, and—if used in sufficiently large amounts—a lowering of the gelatinization temperature of the starch product. While urea is best adaptable for the purposes mentioned above, there are other chemicals that have a like effect, particularly sodium nitrate and the soluble thiocyanates.

Other adjunct materials used in the manufacture of amylaceous adhesives are plasticizers, defoaming agents, preservatives, fluidifying agents, and coloring and flavoring substances. The term "fluidifying agents" is applied to those substances that delay the viscosity increase of concentrated dextrin solutions on aging. Chief among such chemicals are dicyandiamide, acetamide, and other amides. Sugar, glycerol, sorbitol, and ethylene glycol are the most common plasticizing agents used. Octyl alcohol, tributyl citrate, sulfonated oils act as effective foam depressants. Of particular interest is the use of emulsifying agents with adhesives where the surface to be glued is sized with wax or other such substances insoluble in water but soluble in organic solvents. Thus, a paraffin wax surface can be glued with an amylaceous aqueous adhesive by incorporating ten or more percent of a chlorinated solvent and emulsifying it with sulfonated oil.

Also of note is the recent success in making amylaceous adhesives water resistant by combining them with urea formaldehyde or melamine formaldehyde resins. This property has been used extensively of late in the manufacture of corrugated and laminated board for cases used in overseas shipments. Since water resistance is dependent on the number of blocked hydroxyl groups, the best results are obtained by using a starch product which is as little degenerated as possible. Wherever native starch can be used, it is recommended. Where the conditions are such that an adhesive of high solid concentration must be used, British gums of low solubility should be employed. Generally, from 5% to 15% of urea formaldehyde resin is sufficient. The greatest difficulty encountered in using these materials is that the urea formaldehyde resin and starch react rather quickly, particularly when the pH is low, causing a stiffening of the glue which makes it unworkable. By judicious adjustment of pH, it is possible to give the urea formaldehyde amylaceous glues satisfactory shelf life as well as a rate of polymerization that will produce water resistance within the necessary period.

Amylaceous adhesives may be of two general varieties—those requiring heat for dispersion and those that are cold water soluble. The latter consist of high soluble dextrins or British gums in combination with alkaline materials that further help the peptization of the dextrin or British gum. It may also consist of hot roll material in combination with chemicals. Hot roll material is, as the name implies, a material that has been gelatinized and dried on heated drums.

Where heat is required, the general procedure is to make a slurry of the dry material with water in the proper concentration and heat, preferably in a jacketed container, at between 180 to 200° F., holding it there from fifteen to thirty minutes. With tapioca bases, the lower temperature range is sufficient. With corn or wheat bases, the higher temperature is recommended.

The amylaceous adhesives described here are used in a great variety of ways. Chief among their standard uses are as envelope gums; for gummed paper; as labeling glues for glass, metal, wood, and paper; as gums for the manufacture of paper boxes, paper tubes, paper bags, laminated board; as padding glues; and for case and carton sealing.

Axis Manufacture of EXPLOSIVES

by Comm. R. A. COOLEY, U.S.N.R.*

EXPLOSIVES MANUFACTURE IN GERMANY compared favorably with the best American practice, with Japan generally behind both Germany and the United States. American production engineering was definitely superior to that of the Japanese and perhaps even to German procedures. However, Germany was possibly ahead in methods of preparation. Of interest was the increasing tendency of the Germans to use continuous processing and their development of diethylene glycol dinitrate (DEGN) as a replacement for nitroglycerin (NG) in double-base powders.

THE technology of propellant and explosives manufacture in the United States during World War II was probably as advanced if not more advanced than that in Germany or Japan. However, due to the difference of economic factors in different countries it is difficult to evaluate the importance of the technical "advances." For example, in Germany, a significant chemical engineering achievement had been realized in abandoning the use of nitroglycerin (NG) for the substitute diethylene glycol dinitrate (DEGN). This change was not as necessary in the United States as in Germany and hence if it had been accomplished successfully in the United States it would not have represented as valuable and important a progressive step as it did in Germany. The German tendency to use continuous processes more and more in the manufacture of explosives and propellants represents an idea which might well become more general in the United States.

Investigations since the collapse of Germany and Japan have shown that Germany made marked progress in the manufacture of propellants and explosives since World War I, but that Japan was generally behind both Germany and the United States. With regard to laboratory investigation of properties and methods of preparation of high explosives, Germany may have been more advanced than the United States but American production engineering was definitely superior to Japanese and perhaps even to German procedures. Japanese production methods appeared particularly behind times except for one or two ideas.

GERMAN PROCEDURE

German engineers camouflaged most of their production plants exceedingly well, particularly the new plants built from the foundations since 1934. It is not known whether this accounts for the lack of bomb damage. Nevertheless it was striking to find absolutely no bomb damage to at least three German factories, Eibia at Liebenau, Wolff (established 1815) at Bomlitz, and Eibia at Bomlitz. The Dynamit Aktien Gesellshaft (DAG) at Duneberg was bombed twenty-nine days before VE Day but the bombing did not affect the production of the plant very seriously or its rapid repair.

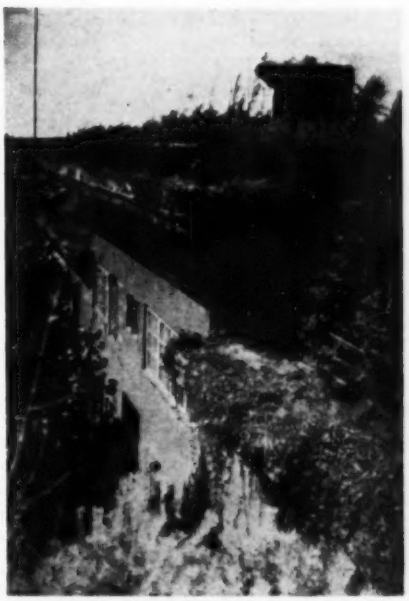
Most of the labor, about 70% (40% of which were women), for German explosive plants was of the unskilled slave labor type and consequently production methods were planned accordingly. As many as nineteen nationalities were represented by the workers in the Eibia factory near the Belsen concentration camp. It was common to see signs with safety regulations in powder plants expressed in nine languages: French, Russian, Polish, Ukranian, Czechoslovakian, Bulgarian, Dutch, Italian, and German.

GERMANS PREFER CONTINUOUS TO BATCH PROCESSES

Although continuous processes for manufacturing explosives have never been very extensively adopted in the United States, they were widely used in Germany. For example the Schmidt process for continuous nitration of glycerin was developed by the DAG at Krummel about 1925, and was generally used in Germany. About 1936 a Swiss by the name of Biazzi developed a continuous process for nitrating glycerin and diethylene glycol. The Biazzi equipment had certain features, notably the separator, which were superior to the Schmidt equipment. These features were combined with the Schmidt equipment and were used in Germany where most of the explosive oil was manufactured by a continuous method.

Pentaeythritol tetranitrate was manufactured in Germany by a continuous method. A serious attempt, although still in the pilot plant stage was being made to manufacture DEGN powder by a continuous process in which a screw press in conjunction with a continuous drying oven served to dewater pre-mix paste. A second horizontal screw press colloided the paste and extruded grains in one continuous operation.

General Uto Gallwitz, an artillery officer in World War I and nephew of the famous World War I General Max von Gallwitz, is given much credit for the adoption of DEGN by the German Army. It appears that after 1918 Uto Gallwitz took up graduate work in chemistry and for a master's degree studied the use of diethylene glycol as a gun recoil fluid and for a doctor's degree studied the nitration of diethylene glycol and its use in propellant powders. From 1935 to 1942 Uto Gallwitz was in charge of



German explosives plants were extremely well camouflaged, as shown by the above three-story plant at Liebenau. It is not known if this accounts for lack of bomb damage.

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powder development in the German Ordnance Department and was in an excellent position to see his ideas adopted by the Army and properly exploited in the powder factories. DEGN powders were said to reduce erosion in guns very markedly. Gallwitz has written that NG powder and DEGN powder were compared under field conditions in the Spanish Civil War. For the same number of rounds fired it was found that NG powder, by erosion, wore out many times more guns than DEGN powder.

HIGH EXPLOSIVES

The DAG which started with the first dynamite plant built by Alfred Nobel at Krummel in 1865 manufactured the largest amount of explosives in Germany although WASAG (Westphalische Anhaltische Sprengstoff Aktien Gesellshaft), Wolff, Eibia, I. G., Rottweil, and Haslock made important contributions. The Krummel plant, typical of German explosive plants, carried out the following operations:

(a) Sulfuric acid concentration by the Pauling method.

(b) Nitric acid concentration by the Pauling method.

(c) Nitrocellulose manufacture (1350 metric tons per month).

(d) DEGN and NG manufacture (1200 metric tons per month).

(e) Paste manufacture (3000 metric tons per month).

(f) TNT (from toluene) manufacture (3000 metric tons per month).

(g) Cyclonite manufacture (80 to 100 metric tons per month).

(h) PETN manufacture (180 metric tons per month).

Germany manufactured DEGN cyclonite, PETN, TNT, tetryl, nitrocellulose, triethylene glycol dinitrate, tetracene, methyl trimethylol methane trinitrate, 1, 2, 4, butanetriol trinitrate, nitrodicyandiamidine, trinitroethyl benzene, lead azide, lead styphnate, and other explosives.

DEGN.—Nitroglycerin has been used as the explosive oil in double base gun propellants since Nobel's introduction of it in 1888. Germany used it in World War I although the shortage of glycerin was severe in Germany. During World War I many Germans were impressed with the following disadvantages of using nitrogylcerin in powder.

(1) The raw material for nitration to nitroglycerin, glycerin, generally can be obtained only from fats or in poor yield from sugar. Both are important foodstuffs and scarce in wartime. (Note. Last month it was reported that a $5.000,000 plant for the production of 30,000,000 lbs. of synthetic glycerin per year by a petroleum refiner was being completed. This process would presumably utilize high temperature chlorination of propylene as the first step and would provide the first non-food source of this very important raw material. (CHEMICAL INDUSTRIES, 59, 539 (1946)—Editor).

(2) Nitroglycerin has a high calorific value (1485 cal./gm.) compared to that of the most favored German powders which have calorific values of 1240, 1150, 950 and 850 cal./gm.

(3) Some Germans felt that the use of nitroglycerin in powder gave rise to excessive erosion and muzzle flash.

Glycol had been nitrated during World War I by the Germans but it proved too toxic to workers, too volatile, and there was slow but noticeable exaporation from finished powders.

About 1929 it was proved that diethylene glycol could be nitrated and was free of the above drawbacks. The raw materials for diethylene glycol were available in Germany in unlimited quantities without using foodstuffs. There are several ways of obtaining diethylene glycol: (a) coal and lime may be used to prepare ethylene oxide, which with water yields glycol from which diethylene glycol may be obtained, (b) ethylene from the waste gases of coke ovens may be converted to ethylene oxide which can be treated as in (a), and (c) diglycol may under special conditions also be obtained from potatoes.

The preparation of DEGN is essentially the same as that of nitroglycerin, (NG) and double base powder is manufactured the same way whether NG or DEGN is used. The advantages claimed for DEGN double base powder by the Germans were: (a) favorable raw material situation; (b) DEGN gelatinizes nitrocellulose better than NG so that the resultant powder grains are smoother and more elastic; (c) DEGN has a calorific value of slightly over 1000 cal./gm. and allows the production of powder of lower calorific value than NG; (d) the storage stability of DEGN powder is greater than that of NG powder; (e) DEGN freezes at —15° C. and may be supercooled to —25° C. and less for weeks without freezing, and less sensitive to detonation than NG; (f) the manufacture of DEGN powder is safer than that of NG powders especially in that roll fires are less common with DEGN than with NG powders.

PETN.—Since the German continuous process of nitrating and refining PETN may be superior to the batch process used in the United States, some details are presented here. The continuous process had been developed at the Troisdorf DAG. The estimated total installed capacity for production of PETN in Germany was about 3,000,000 pounds per month, but the largest monthly production probably was achieved in June 1944 when about 2,200,000 pounds were produced. Table I shows the capacity of German plants for the manufacture of PETN, used in boosters, demolition blocks, and small shells. PETN was not mixed with TNT for melt loadings because of its marginal stability. Germans felt that PETN was superior to tetryl because its starting materials were more readily available, it pressed into pellets better, gave a greater explosive strength, and was more water resistant.

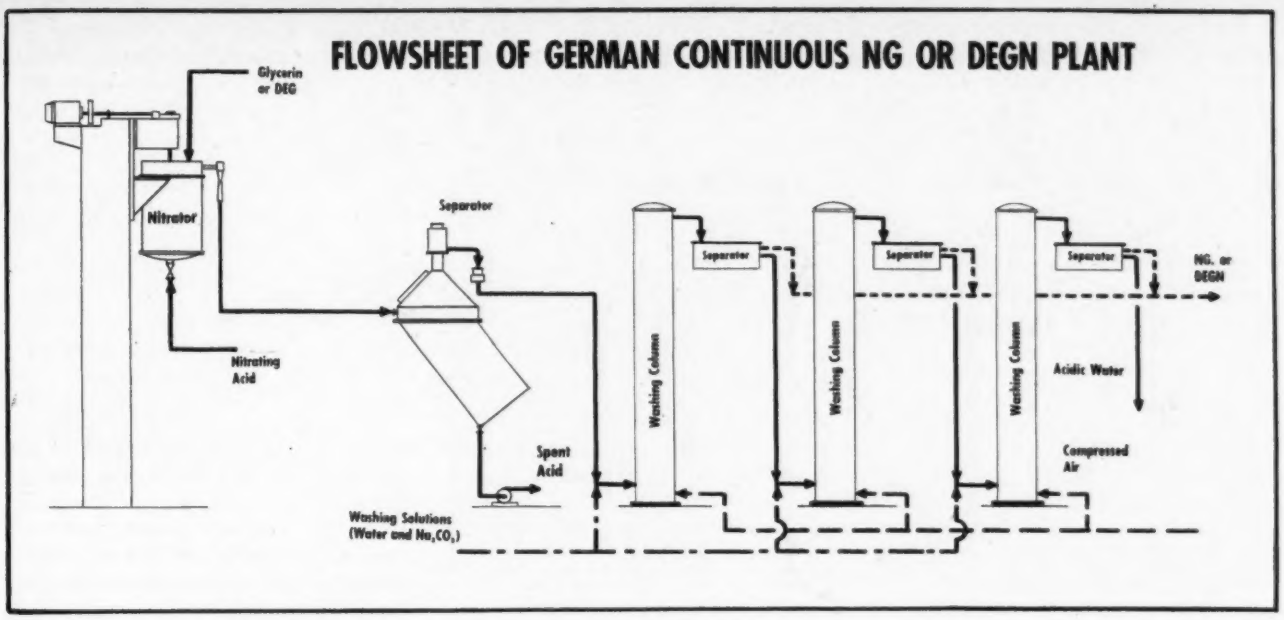
TABLE I
CAPACITY OF GERMAN PLANTS FOR THE MANUFACTURE OF PETN

	Metric tons per month
Troisdorf (DAG)	50
Krummel (DAG)	180
Malchow (DAG)	450
Wolfratshausen (DAG)	600
Reinsdorf (WASAG)	150
Semting (Explosia)	10
Total	1440

All container equipment for manufacture of PETN was made of 18-8 stainless steel. I. G. Farben supplied 97-98% pentaerythritol with a melting point of 250° C. and 98-99% nitric acid.

Pentaerythritol (PE) was fed con-

Nitrators at Wolfratshausen for production of penterythritol tetranitrate (PETN). This plant, representing about 40% of the German PETN capacity, uses continuous nitration.



tinuously to a nitrator from a hopper by means of a screw conveyer. Nitric acid (5-6 parts per part of PE) was introduced through a rotameter from a constant head tank. The first nitrator was a cylindrical 500 liter vessel with a jacket and coils carrying ammonium nitrate brine at —5° to —11° C. The temperature of the liquid was maintained at 15° C. with agitation.

The reaction mixture overflowed from the first nitrator to the second nitrator of 170 liter capacity. Here the temperature was lowered to 10° C. The nitric acid had a concentration of 80% The mixture then overflowed to the diluter where water was added to reduce the acid concentration to 30%. The temperature was held at 15 to 20° C. by means of agitation and brine cooling. The dilution precipitated the crystals of crude PETN from the acid solution, and the slurry of crystals then overflowed to one of two cylindrical neutsche filters through a swing pipe that could be directed to either filter.

From a hole in the center of the 18-8 stainless steel filter cloth a pipe led out the bottom of the filter. In operation, the hole was closed by a conical plug. The slurry was run in with suction until a charge in the filter had accumulated. The swing pipe was then moved to deliver to a second neutsche. After drawing off as much acid as possible, the conical plug was removed and the filtered crystals were washed to an agitated tank. The resulting slurry was pumped to the continuous washing system consisting of a tank for water washing, a neutsche to remove the acid water, a tank for neutralizing with sodium carbonate solution, and a final neutsche.

The crude, washed PETN was then transferred to the continuous refining building. Here it was dissolved in acetone, the solution filtered, water added to precipitate the PETN, and then run through three stills to remove the acetone. The hot slurry was cooled and run to one of the three neutsches for final filtering.

It was stated that melted montan wax could be added to the third still for phlegmatizing the PETN when desired.

Cyclonite.—The German Military was well aware of the valuable properties of cyclonite (cyclotrimethylene trinitramine) as an explosive. Production by industry was encouraged as early as 1935. In June 1944 Germany produced 7,700,000 pounds of cyclonite. For planned expansion of manufacturing capacity the so-called KA method was chosen because it was most economical of the basic raw material, methanol (or formaldehyde). Table II shows the capacity of German plants for the manufacture of cyclonite or hexogen, as it was sometimes termed.

TABLE II

CAPACITY OF GERMAN PLANTS FOR THE MANUFACTURE OF CYCLONITE

Factory	*Capacity in tons/month*	*Method*
Bobingen (DAG)	100-125	E changed KA
	250	KA
Elsnig (WASAG)	200	K
	150	KA
Ueckernumde (DAG)	250	SH
Doberitz	500	SH
Christianstadt (DAG)	3000	SH
Krummel (DAG)	Explosion Jan. 1943 not rebuilt	W

The five methods of manufacture are:

The W process is so named after Dr. Wolfram of the I. G. Farben who worked the following series of reaction into a continuous process for producing cyclonite:

(1) $SO_3 + NH_3 \longrightarrow NH_2SO_2ONH_4$

(2) $2SO_3 + 3NH_3 \longrightarrow NH(SO_2ONH_4)_2$

(3) $NH_2SO_2ONH_4 + NH(SO_2ONH_4)_2 + Ca(OH)_2 \longrightarrow (NH_2SO_2O)_2Ca + CaSO_4 + 3NH_4OH$

(4) $(NH_2SO_2O)_2\,Ca + 2K_2SO_4 \longrightarrow 2NH_2SO_2OK + CaSO_4$

(5) $NH_2SO_2OK + CH_2O \longrightarrow CH_2 = NSO_2OK + H_2O$

(6) $CH_2 = NSO_2OK + 3HNO_3 \longrightarrow (CH_2NNO_2)_3 + 3KHSO_4$

The E process is named after Dr. Ebele who developed a batch process at Rottweill based on the reaction.

$3CH_2O + 3NH_4NO_3 + 6(CH_3CO)_2O \longrightarrow (CH_2NNO_2) + 12CH_3COOH$

The K process was worked out by Dr. Knoffler of WASAG and is dependent on the reaction.

$C_6H_{12}N_4 + 2NH_4NO_3 + 4HNO_3 \longrightarrow 2(CH_2NNO_2)_3 + 6H_2O$

The SH process was developed into a satisfactory large scale process by Dr. Schnurr of DAG using the ideas of the Henning patent of 1899.

$C_6H_{12}N_4 \cdot 2HNO_3 + HNO_3 \longrightarrow (CH_2NNO_2)_3$

The KA process,

$C_6H_{12}N_4 + 2HNO_3 + 2NH_4NO_3 \cdot HNO_3 + 6(CH_3CO)_2O \longrightarrow 2(CH_2NNO_2)_3 + 12CH_3COOH$

is a combination of the K and E process which has the advantage over the E process that the use of hexaminedinitrate in place of formaldehyde, for the same yield of cyclonite, produces only half the amount of water and hence requires only half the amount of acetic anhydride. Thus the equipment at Bobingen DAG at first produced about 125 tons per month of cyclonite by the E process but in the beginning of 1944 shifted to the KA process and without increasing the amount of equipment increased production to about 250 tons per month of cyclonite.

PROPELLANTS

German propellant powders for guns consisted of nitrocellulose powders and double base powders containing DEGN. These powders were made in a variety

of shapes: single perforated tubes, thin leaflets, washers, strips, and noodles. German powders are generally characterized by a lower caloric value than those of other countries. In addition to colloidal powders of the solventless and solvent type, including porous nitrocellulose powder obtained by leaching out salt originally incorporated in the powder, the Germans had invested much effort in a cast propellant and there was a miscellaneous group of powders based on ammonium nitrate; dicyandiamide, DEGN, and nitrocellulose; methylene urea, DEGN and nitrocellulose; nitrodicyandiamidine, DEGN, and nitrocellulose. Although 10,000 grains of the cast propellant for the 15 cm. Nebel Werfer rockets were manufactured, cast propellant was not satisfactory and never became operational.

Rocket Propellants.—In 1935 Germany's solid rocket propellant consisted of a pressed, rather inactive black powder mixture with about 30 per cent extra carbon. In 1937 DAG and Rheinmetall-Borsig were asked to develop a more satisfactory rocket propellant. Since the Germans had used double base powder for artillery for some time, they drew on their experience with gunpowder when developing rocket propellant powder. The situation was different from that of the United States Navy which passed from single base gun propellants to double base rocket propellant.

Several rocket propellant compositions of the solventless DEGN nitrocellulose type were developed, and a composition containing triethylene glycol dinitrate was hit upon which had adequate physical properties and was used in 15 cm. rocket assisted shells for test as early as 1940, and for operational use in 1942. The 28 cm. and 32 cm. Nebel Werfers were used against the Russians in 1941.

Gun Powders.—The nitrocellulose used by Germany was made from wood cellulose crepe paper. A blend of high (about 13.2%) and low (11.3%) nitrogen nitrocellulose was employed for solventless propellants. The viscosities of the nitrocelluloses were reduced to the desired values by pressure cooking.

Generally German methods of mixing, rolling and extruding double base solventless powder were quite similar to methods used in the United States. However there were a few exceptions. At Bomlitz a wet mixture unit much larger than ones in the United States was installed in 1944. For a single mixing of nitrocellulose and DEGN the total capacity of the unit was increased from the normal amount to about 100 kgs. to 8,000-10,000 kgs. The German's largest extrusion press for preparing ultra large rocket grains was a horizontal one developed at the Duneberg DAG in 7944. It had a 200 kg. capacity cylinder and would extrude grains up to 32.5 cm. in diameter. Table III shows the production capacity of some German propellants and explosives factories.

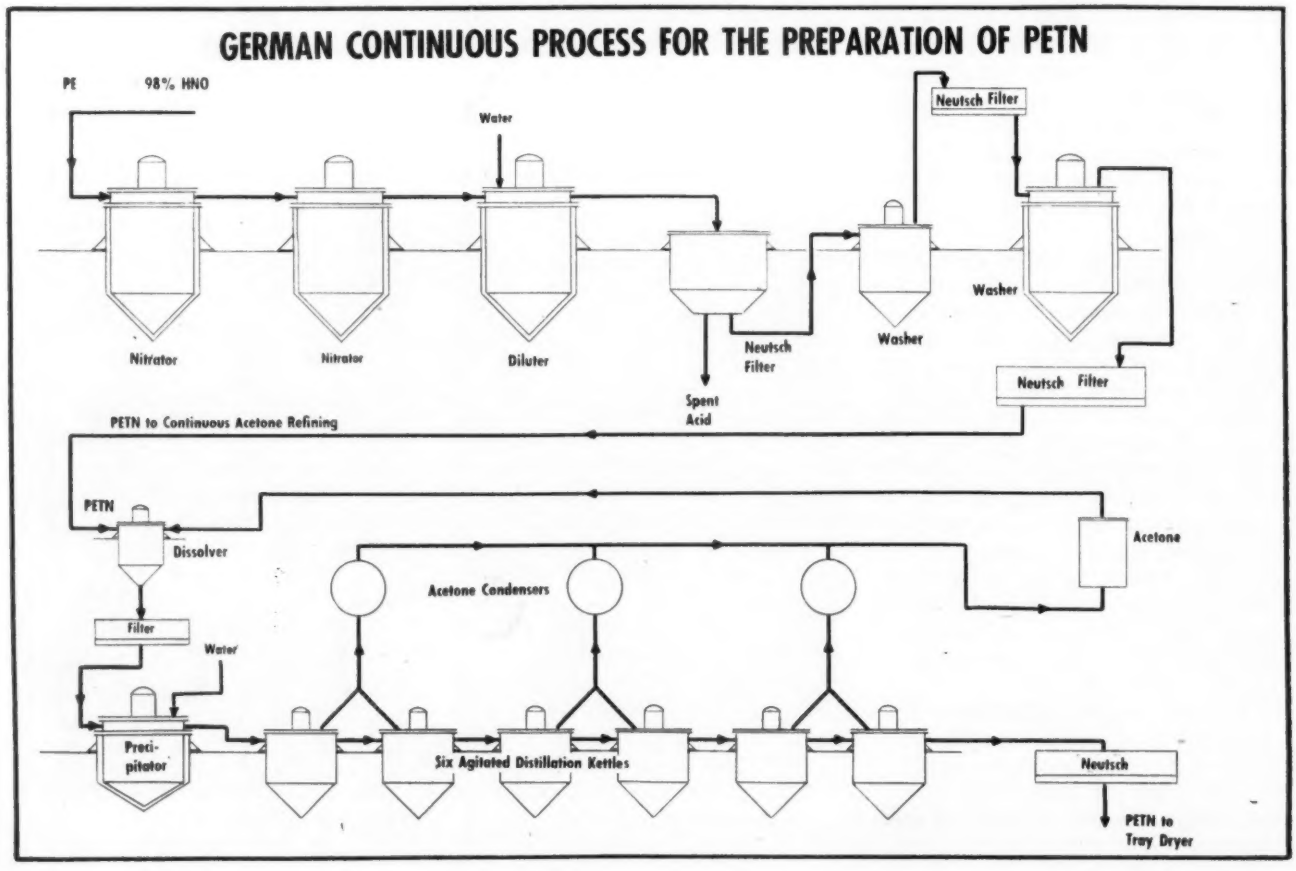
TABLE III

DATA ON PRODUCTION CAPACITY OF SOME GERMAN FACTORIES

Factory	*Number of workers*	*Product*	*Capacity*
Kiebizort (Wolff and Co.)		DEGN powder	200 tons/month
Lohheide (Ebia)	4500	DEGN powder	35 tons/day
Fuhrenkamp (Ebia)	4500	DEGN powder	25 tons/day
Fuchsberg (Ebia)		NC powder	8 tons/day
Doerverden (Wolff and Co.)	1400	NC powder	20 tons/day
Liebenau (Ebia)	3000	DEGN powder	100 tons/month (1941)
		DEGN powder	1000 tons/month (Aug. '42)
		DEGN powder	1966 tons/month (Jly. '44)
		DEGN powder	2000 Kilo/hour
		Cast powder	30 tons/day
Duneburg (DAG)	5000	Propellant powder	3000 tons/month
Krummel	9000	TNT, PETN, Cyclonite, dynamite, oleum, plastics	
		NC	1350 tons/month
		NG or DEGN	Corresponding to paste requirements
		TNT	2800-3000 tons/month
		PETN	180 tons/month
		Cyclonite	100 tons/month

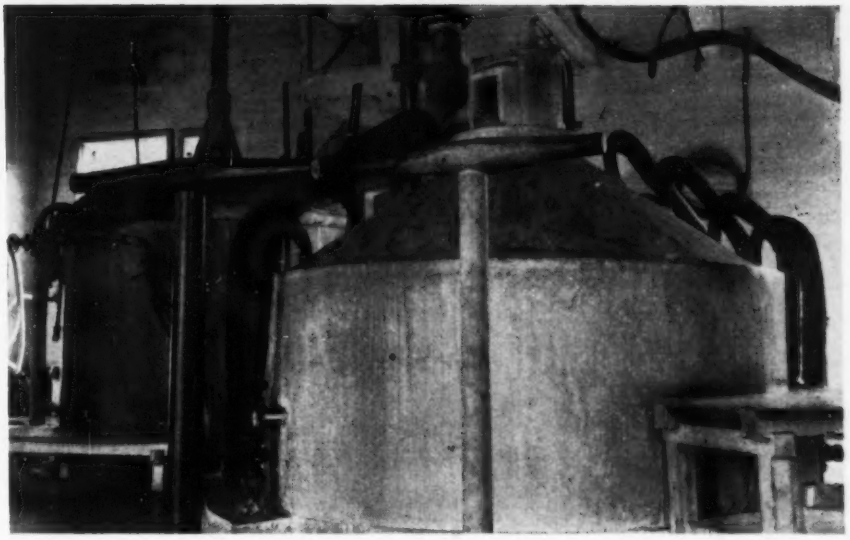
JAPANESE PROCEDURE

Some American experts, on investigating Japanese facilities and methods of manufacturing explosives shortly after VJ Day, stated that the methods used were similar to those of the United States in 1925. This is probably more true of high explosives than propellants. The



Japanese made a good rocket propellant more temperature insensitive than American rocket propellant. With the exception of a continuous nitrator for cellulose and certain propellant stabilizers which were evolved from an extended study, the Japanese appeared to have little that was novel or outstanding compared to modern American powder factories.

This is perhaps not too surprising if one considers Japan's background in the manufacture of explosives. In the Russo-Japanese War 1904-1905 Great Britain supplied most of Japan's ammunition. In 1908 a powder factory was constructed at Hiratsuka under British supervision by the Armstrong Company. Not until 1918 was this factory placed under complete Japanese control. In accordance with Japanese nomenclature it became the "Second Naval Powder Factory." The Second Naval Powder Factory at Hiratsuka was the oldest naval powder factory and the center of research on solid rocket propellant in Japan. Its total productive capacity had been about 50 tons of rocket propellant, 300 tons of cannon propellant, and 300 tons of machine gun propellant per month. On July 16, 1946 the factory had been bombed and was about 30% destroyed.



Typical glycerin nitrator at Hiratsuka in Japan. The rubber hoses to and from the nitrator carry thermometers and carry hot or cold water for thermostatting. The large wooden handles in the foreground are for manually drowning nitroglycerin in case of need.

In 1922 a picric acid factory was constructed at Maizuru which became the "Third Naval Powder Factory." As a gesture in 1923 for the benefit of the disarmament conferences going on in Washington a picric acid factory located near Tokyo was disassembled, but its equipment was secretly shipped to Maizuru. In 1938 the Japanese constructed the "First Naval Powder Factory" at Funaoka. Prior to 1935 private firms producing high explosives (mostly picric acid) for the Navy were Mitsui Kagaku Kaisha, Yura Senryo and Kagaku Seijuosho.

The writer did not learn as much about the Japanese Army as Navy experience in explosive manufacture but it is known that the Imperial Japanese Army Tokyo Arsenal Number Two controlled all

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TABLE IV

LIST OF IJN ARSENALS AND PRIVATE PLANTS PRODUCING EXPLOSIVES AND PROPELLANTS

Name	*City*	*Prefecture*	*% Damaged***
IJN ARSENALS			
Funaoka Naval Explosive Factory	Funaoka	Miyagi	0
Hiratsuka Naval Explosive Factory	Hiraksuka	Kanagawa	30
Maizuru Naval Explosive Factory	Maizuru	Kyoto	0
PRIVATE PLANTS UNDER CONTRACT			
Nihon Kako K.K.	Okitsu	Chiba	10
Kanto Denki Kogyo K.K.	Hodagaya	Kanagawa	5
Nihon Yushi K.K.	Taketoyo	Aichi	5
Yura Senryo K.K.	Hibi	Okayama	0
Nihon Kauaku Seizo K.K.	Asa	Yamaguchi	0
Mitsubishi Kasei K.K.	Kurosaki	Fukuoka	0
Mitsui Kagaku Kogyo K.K.	Omuda	Fukuoka	5
Nicchitsu Kagaku Kogyo K.K.	Nabeoka	Miyazuki	10
Chosen Chisso K.K.*	Konana	Chosen	0

* Also produced for the IJA.
** Expressed in productive capacity destroyed or damaged.

TABLE V

LIST OF IJA ARSENALS PRODUCING EXPLOSIVES AND PROPELLANTS

Plant	*Location Perfecture*	*Chief Products*
Iwahana	Gumma	C smokeless and black powder
Itabashi	Tokyo	C smokeless, yellow and brown powder
Uji	Kyoto	C smokeless and explosives
Tadano	Hiroshima	Small explosives and gas
Tana	Tokyo	Explosives
Sone	Fukuoka	Small explosives and gas
Kori	Osaka	Explosives
Sokanoichi	Oita	Smokeless and explosives
Arao	Kumamoto	Explosives
Fukaya	Saitama	C smokeless
Kushibiki	Saitama	C and G smokeless and E gun powder

TABLE VI

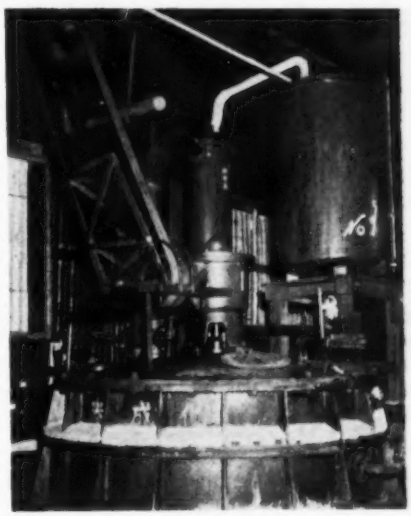
EXPLOSIVES PRODUCTION AT THIRD NAVAL POWDER FACTORY, MAIZURU

	Daily Rate of Production Tons	*Cost per ton (yen)*	*1940*	*1941*	*1942*	*1943*	*1944*	*1945 until Aug.*
Picric Acid	2	3.10	670	....	203	600	834	53
TNA	8	3.15	650	2,000	2100	2100	1638	427
HND	6	3.73	435	1,200	1350	596	541	100
PETN	800 kg	6.78	...	....	....	....	....	....

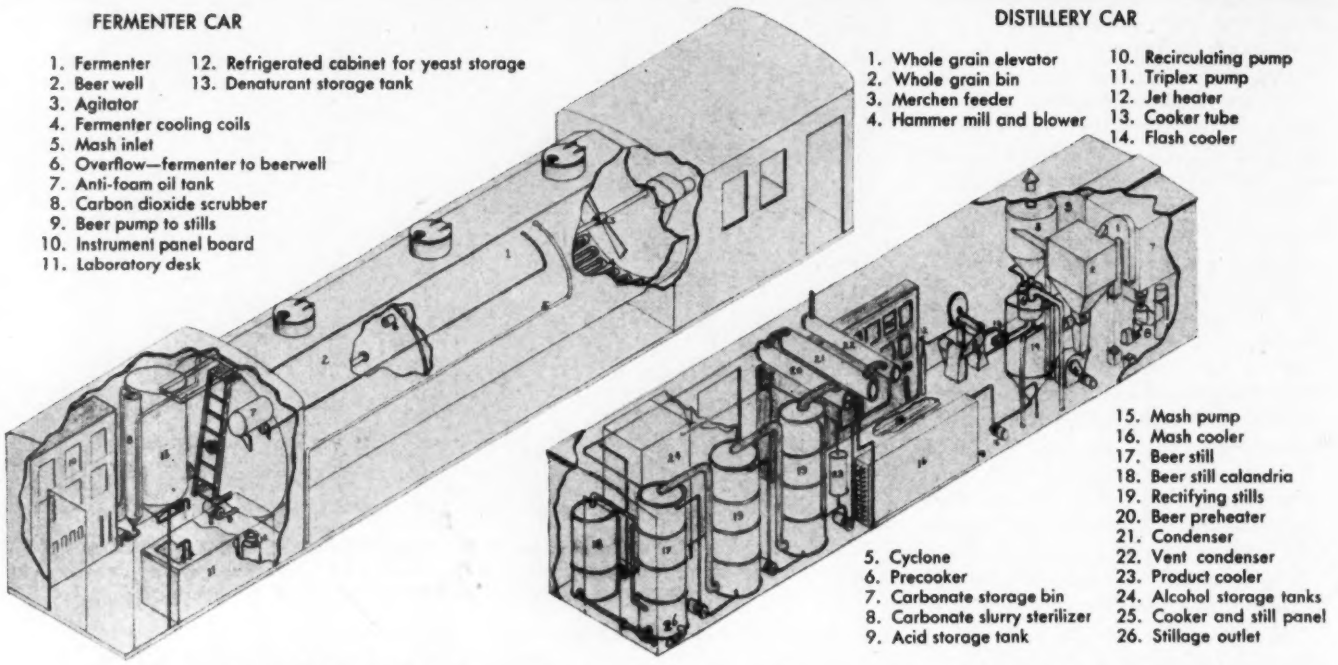
TABLE VII

PROPELLANT AND EXPLOSIVES PRODUCTION AT TAKETOYO FACTORY OF NISSON CHEMICAL INDUSTRIAL CO.

	Monthly Production (tons)	*Total Production in Tons* *1940*	*1941*	*1942*	*1943*	*1944*	*1945 until Aug.*
Military Propellants	210	....	....	....	....	....	....
Military High Explosive	160	....	382	517	948	856	344
Dynamite	810	6014	6142	6497	6132	5386	1627
Sporting Powder	5	....	....	....	....	....	....
Cannon Propellant	...	420	576	1017	1025	935	379
Machine Gun Propellant	...	....	....	....	48	180	42
Rocket Propellant	...	....	....	....	....	....	13



Nitrator for the production of trinitroanisol at Maizuru in Japan. This material is generally considered to be too deleterious to the workers' health for manufacture in the United States. However, the Japanese stated that most workers, after the first attack, enjoyed a certain degree of immunity from dermatitis.



Seagram's design for a mobile alcohol production unit consists of a five-car railroad train which houses all of the usual distillery operations. The unit is designed to process about 500 bushels a day of surplus or substandard grain to make 1250 gallons of alcohol.

ALCOHOL ON THE HOOF

Seagram's Designs Mobile Continuous Process Alcohol Unit

WITH THE SHOWING LAST MONTH of a working miniature of a continuous industrial alcohol plant, Seagram's brings one step closer to actuality its prediction of mobile distilleries and compact individual units for farms.

EARLY last year engineers of Joseph E. Seagram & Sons completed the design for a continuous process industrial alcohol unit that could be moved about the country on a five-car railroad train. The project had long been a pet of H. Fred Willkie, Seagram's production vice president. If farmers could be provided with a really economical processing unit for making alcohol out of agricultural wastes and sub-standard and surplus crops, Willkie reasoned, the chances were good that they could get fuel for their tractors, trucks and other farm machinery for less than it would cost them to buy gasoline and at the same time get something that could be put back into the soil in the form of stock feed or fertilizer.

Until last month the mobile alcohol unit as far as the public was concerned, had got no further than the drafting boards. At the National Chemical Exposition in Chicago, however, the Seagram company showed for the first time a small-scale demonstration model of the continuous fermentation process it proposes to put into the larger rolling unit.

The demonstration model, although little larger than a kitchen stove (see photograph on next page), actually operates in continuous cycle with full automatic controls. It will produce 7½ gallons of 95 per cent ethyl alcohol per day from three bushels of grain (or potatoes or fruit or any other carbohydrate crop).

THE PROCESS

Steps and operating details of the demonstration process are the same as would be carried out in the larger railroad train unit: Grain is ground to the desired fineness in a hammer mill. Then it is mixed with warm water and sulfuric acid to produce a mash. The acid serves instead of malt to convert the starch of the material by hydrolysis to fermentable sugar. The acidified mash is pumped at a continuous controlled rate to a steam jet heater, where it is instantaneously heated to approximately 350 deg. F. by steam. It is held at this temperature for approximately three minutes, long enough to complete the cooking and convert the starch to sugar. Then it is cooled to 212 deg. F. and the acidity adjusted with calcium carbonate. After further cooling to about 85 deg., it is pumped into the fermenter, where it is inoculated with a pure yeast culture. The fermented mash is finally pumped into the distillation system, where alcohol is separated from the mash and drawn off.

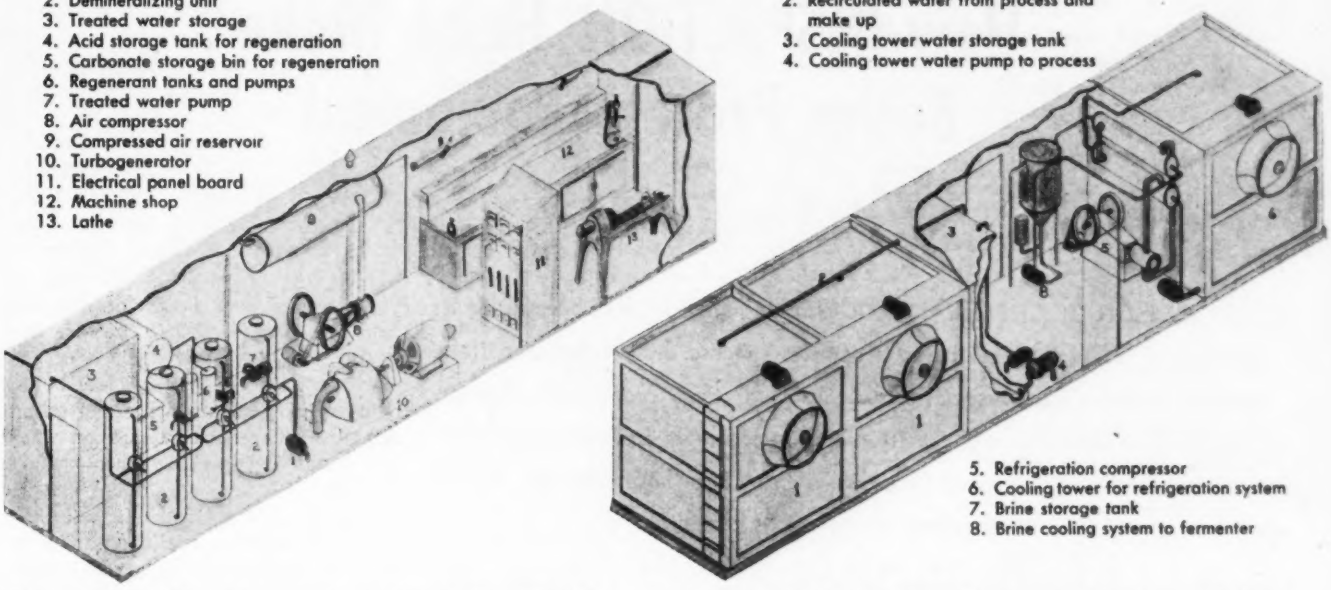
The design for the railroad car unit is based on a throughput of 500 bushels of grain per day with a yield of 2.5 wine gallons of alcohol per bushel. The proposed unit is complete within itself. In addition to the fermenter, distillery, cooling tower and utilities cars shown above, it includes a boiler car complete with coal storage and conveying facilities. With the exception of water make-up, the train is capable of supplying its own requirements for a period of one week. It treats and cools its process water, generates its own steam and electricity, and is equipped to carry out its own repair and mainte-

UTILITIES CAR

1. Raw water inlet pump
2. Demineralizing unit
3. Treated water storage
4. Acid storage tank for regeneration
5. Carbonate storage bin for regeneration
6. Regenerant tanks and pumps
7. Treated water pump
8. Air compressor
9. Compressed air reservoir
10. Turbogenerator
11. Electrical panel board
12. Machine shop
13. Lathe

COOLING TOWER CAR

1. Cooling towers for process water
2. Recirculated water from process and make up
3. Cooling tower water storage tank
4. Cooling tower water pump to process
5. Refrigeration compressor
6. Cooling tower for refrigeration system
7. Brine storage tank
8. Brine cooling system to fermenter



The process used is based on a continuous fermentation method involving acid hydrolysis of the starches instead of malting. A fifth car of the train, not shown here, houses a complete steam producing plant including coal storage and conveying facilities.

nance work except for major jobs. Raw material and other supplies for at least one month's operation can be transported with the unit on additional cars if required. Complete cost of the five-car train, including cars, equipment, installation costs, and ten per cent fees each for contracting and engineering, is estimated at today's prices to be about $215,000.

In addition to the demonstration unit displayed at Chicago, Seagram engineers offer as substantiation of the technical feasibility of the mobile plant the fact that all steps and equipment involved, with the exception of the continuous fermentation, are the same as used in proved commercial practice. The grain handling and distillation are conventional commercial processes. The still is a redesign of a conventional two-column unit to fit into the available space. The acid hydrolysis operation was developed and reported in connection with wartime work on 2,3-butylene glycol.

At the National Chemical Exposition in Chicago last month this small-scale unit demonstrated the process contemplated for the mobile plant. Operation is continuous and automatic.

CONTINUOUS FERMENTATION

Study of continuous fermentation was begun by the Seagram research department in 1940. The problem, as far as operation on grains and other carbohydrates was concerned, was to overcome the relatively slow conversion of dextrines to fermentable sugars by mold amylase. This conversion requires 36 hours or longer, which obviously could not be tolerated in a continuous operation. The problem was solved, at least as far as industrial alcohol is concerned, by substituting the acid hydrolysis step for enzyme conversion. This has cut conversion time down 5 to 10 minutes. Further, the acid treatment simultaneously sterilizes the mash, so that it is ready immediately to receive the yeast culture. It is the elimination of this bottleneck which has brought the idea of a mobile unit into the range of serious consideration.

Alcohol is of course still an expensive fuel. For this reason, Mr. Willkie and Seagrams emphasize that their program is at present "aimed to help those countries which have a short supply of other fuels and which must compete for existence in a mechanized world. In this country it is a strictly agricultural—not commercial program for the utilization of waste and surplus crops so that farmers can grow their own tractor, truck, and automobile fuel and give back to the soil the rich byproducts of the fermentation process".

How INSPECTION Helps Make Better Process Equipment

by W. A. MILLER* and G. E. KOPETZ,** Chemical Plants Division
Blaw-Knox Company, Pittsburgh, Pennsylvania

FABRICATION OF CHEMICAL PROCESSING EQUIPMENT, because of its specialized nature, in most cases is done to specific designs for each item. Because of the detailed specifications involved, close cooperation between customer and fabricator is necessary. This, increasingly, has meant the presence of a customer's trained inspector throughout the fabrication of the equipment to follow the sequence of operations charted here.

THE scope, purpose, and results of inspection during the production of chemical plant equipment are known in a general way to the users. Primarily, inspection assures the quality of equipment designed by the engineering department, and guards against costly errors during fabrication and the danger of early failure in service. Since inspection entails expense, it is obvious that it must pay dividends to be tolerated. Many of these returns are difficult to measure because the results are usually of the preventive type and represent the unpredictable errors that are prevented or corrected and the defects that are avoided.

The value of inspection is measurable only on the basis of general experience and on statistics based on probabilities. The shortest answer to the question of returns is probably to be found in the trend toward increased inspection, which is greatly abetted by more numerous production bottlenecks in today's complex equipment.

INSPECTION PROBLEMS

Answers to three questions best detail the functions of an inspector. They are:

1. Why inspect?
2. How much inspection?
3. What quality of inspection?

Why inspect? For the same reason that a drawing is checked, back-checked and re-checked; for similar reasons that numerous purchasers of materials spot check and laboratory test their purchases. The vendor is usually honest but orders are filled and shipments made by human beings and errors are bound to occur. An equipment manufacturer of good reputation welcomes a check of the work done in his shop by persons capable of evaluating good work; he consider the right type of inspection helpful to him in preventing errors. Improperly oriented or located nozzles and connections mean delays and extra costs. The wrong size or type of flanges causes loss of time and money in connecting piping. Uncoordinated location of lugs or saddles or the anchor bolt holes in these parts prevent mating with the anchor or holding down bolts imbedded in the concrete foundation.

The psychological aspect of inspection during fabrication impels the workmen and the shop to attach greater importance to the work because the customer has demonstrated the importance he attaches to equipment by having his representative present at the shop.

The question of "quantity of inspection" deals with the degree, extent, and frequency of inspection. In general, the extent of inspection should be in proportion to the complexity of a vessel's structure and to its importance in the cycle of operation. It is disconcerting if the duplication of equipment that is provided to minimize the possibility of breaking the continuity of operation is found to be useless because the process bottlenecks into one vessel, which would take weeks for replacement and which would be extremely costly to provide in duplicate. This is often overlooked in a discussion of detailed inspection but the primary fact is that adequate inspection is a function of the nature of the equipment.

In passing on to consideration of the "quality of inspection," the first premise is that regardless of the degree or extent of inspection there is no room for slipshod examinations.

Some idea of the many things that should be investigated and verified will be gained by following the inspection procedure for a simple piece of equipment which follows. However, no set of rules will cover all the possibilities. Hence, it must be emphasized that alertness and vigilance are ever important, and that numerous bits of tell-tale evidence have a degree of obviousness which depends only on the observer's interpretation in the light of his past experience and on anticipation with sound imagination where previous direct experience is not available. At best, there are many things that are not easily verified or detected, at least without destructive tests. With the increasing high quality demanded in engineering, designing, and selecting materials of construction in a like manner high quality of inspection is mandatory.

Because inspection is done by human beings, the qualifications of an inspector have been more or less defined in discussing the "quality of inspection." Briefly, the inspector must have a good foundation in engineering design, in the nature and use of materials of construction, the methods of heat treatment and forming the materials, and the fundamentals of metallurgy. A qualification that is not so obvious is ability to get along with all people, from the "front office" to the janitor in the shop. The human problems are often more difficult to handle than the mechanical problems.

The recognition of these problems is shown in the following excerpt from the inspection manual issued by one large organization to members of its inspection staff:

"When you visit a shop or plant, you are a guest of the plant management and simultaneously a representative of the ..... Co. As such, a concrete physical connecting link between the company and vendor, you should always bear in mind that the vendor's opinion of our company and its clients will be greatly determined by your bearing and demeanor while at the plant."

PURPOSES

Limited space prevents an intimate treatment of every ramification of inspection but a brief treatment of the fabrication methods with which the inspector is constantly in contact and which are major factors in meeting engineering specifications is necessary. The scope of the subject and field of influence are indicated in Flow Sheet No. 1, which illustrates a number of the various procedures by

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which a vessel may be manufactured, ranging from shop to field fabrication. Complete fabrication or complete assembly are possible in either shop or field.

One block in Flow Sheet No. 1 has been expanded into Flow Sheet No. 2, which illustrates the way the Inspection Division keeps constant watch over the progress of fabrication. In this instance fabrication of a pressure vessel is used for illustration.

In the usually accepted sense, inspection is not expected to begin functioning until the actual vessel fabrication is started in the manufacturer's shop, and is often confined to assuring completion of a piece of equipment in accordance with pre-determined designs and specifications. A few organizations have progressed to the point where inspection is made a source of operating performance data on the functioning of completed units in addition to its primary role. These and other desirable objectives of inspection are:

A. Provision of a connecting link between design and fabrication to the extent that desirable new designs should stimulate the shop to improved manufacturing methods and reflection of improved shop practices in improved engineering department designs.

B. Service as liaison between the engineering department and the field erector in interpreting the intent and purpose of certain engineering department policies and constructions; to convey to the engineering department the benefits of improved methods and constructions developed by erection crews and their supervisors; and to devise ways and means of incorporating any such desirable methods into new designs as promptly as practicable.

C. To provide assistance and advice to the field erector in setting up adequate inspection schedules, effective forms of inspection for given purposes, and specialized help in preparing welding specifications, testing welding procedures, and qualifying welding operators.

D. Service should be so scheduled that various construction sites are visited at regular intervals during construction and erection so that possible errors can be corrected before trouble becomes difficult to rectify; so that progress information will be available promptly to those who are interested; and so that desirable changes may be placed before the engineering department for early consideration and action.

E. Contact should be maintained with a completed job by periodic visits during the operating life of the equipment to secure information on rates of deterioration of plates and piping that are exposed to unusual operating conditions and on service performance of instruments, pumps, compressors, and other mechanical equipment so that sound data will be available for use in future designs.

F. For consultation in standardizing designs, practices, equipment, erection methods; integrating tolerances and influencing choice of erection equipment.

G. To help in training designers by correlating the application of theory to the actuality of a finished project.

H. Provision of an important factor in maintenance of standards of quality for a finished product.

I. Building the prestige of an organization through its contacts with outside fabricators and contractors.

J. Provision of a contact with the legal authorities concerned with the enactment and enforcement of codes. Through such contact, proposed changes of statutes may be influenced one way or the other by adding important new considerations affecting the welfare of all concerned. Thus, early notice of possible changes are secured and may be of considerable value from the standpoint of design and construction. Such contacts are also valuable in many instances in securing waivers of compliance with technical violations of statutes before such violations occur, or even afterwards.

K. Contacting outside research organizations and quasi-judicial bodies, such as committees responsible for formulation of codes, to secure the benefit of new methods in inspection, construction, and design.

PRIMARY INSPECTION PROCEDURE

To make inspection more specific, a typical phase of the subject has been selected for close examination. Based on experience among and with chemical engineers in the field and in the classroom, it is apparent that the engineer's principal difficulty in evaluating the details of inspection work results from a lack of knowledge of the general procedure followed in a plate-fabrication shop and, in particular, a "tank shop".

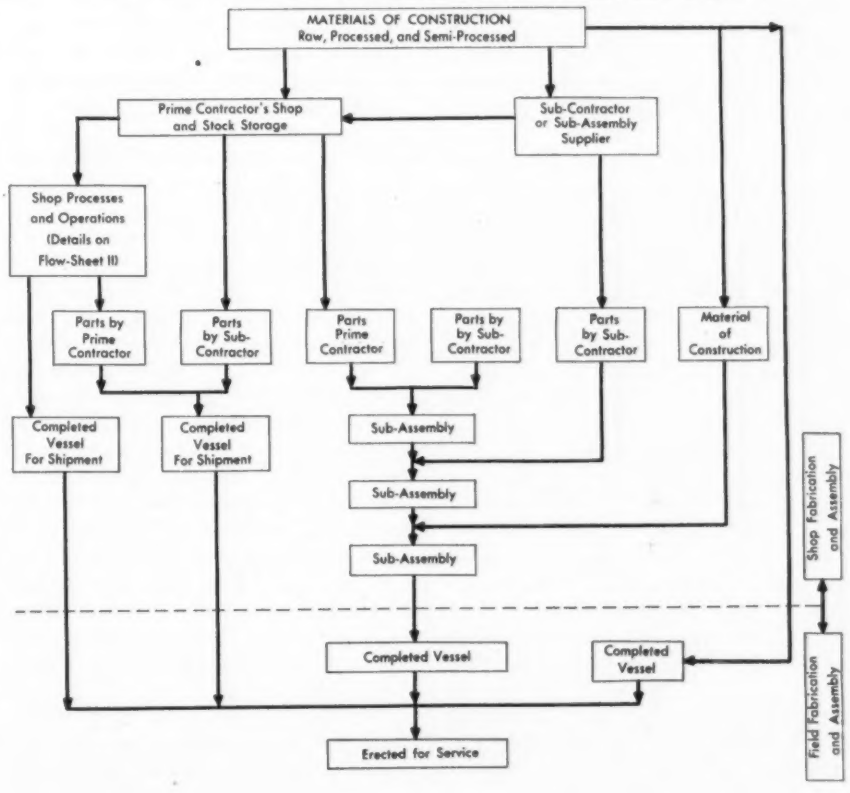
Both time and space limit the discussion to a shop fabricating vessels to the ASME Boiler Construction Code, and equipped for manual metallic arc welding, stress-relieving, and X-ray examination. The sequence of operations would be generally represented by Flow Sheet No. 2.

With this flow cycle operations sheet as a guide, the component parts of a "tank" will be followed through a "tank shop" where it will be shown how inspection is normally accomplished. The operations sequence will be used also as a check list of some factors to be considered in preparing vessel specifications.

Inspection starts at stock storage. The material that was selected for the shell plate is examined. The specifications for the vessel require these plates to be flange quality steel meeting the current revision of ASTM A-70.

Signed mill test reports on the steel are requested of the vessel fabricator by the inspector. These reports are checked to see that the material was made by the open-hearth or electric process and that physical and chemical requirements are within the limits defined by specifications, ASTM A-70, Sec. 5, 15. The plate is examined for identification stamps showing the name or brand of the manufacturer, the grade or class of the steel (if the specification covers more than one grade or class), the heat and slab numbers, and the lowest tensile strength of the specified range for the

FLOW SHEET 1 — Common Methods of Obtaining Completed Vessels



class of steel. The identifying stamps are checked with the numbers shown on the mill test reports to make sure that the report applies to the plate examined.

Finding these data in order, the plate thickness is checked at a number of available points to ascertain that the thickness tolerance is within specified limits (ASTM A-70, Sec. 13, 14). A systematic surface inspection of the plate is next undertaken to detect the possible presence of cracks, blisters, blowholes, pit marks, excessively deep nicks, hammer marks, or other injuries which might act as stress-raisers and form the nucleus for crack formation or development of other serious defects during the future forming, cutting and joining operations.

Since the specifications call for a class of construction permitting a 90% joint efficiency, shallow depressions up to 10% of the solid plate thickness may be tolerated. However, attempts will be made at the proper time to put such depressions or other surface imperfections in an area that is to be occupied by a nozzle, manhole, other connections, or attachment so that the points of doubtful quality will be cut-out or cornered by a saddle, which will serve the triple purpose of supporting the vessel, reinforcing the depression, and covering an unsightly area. These and other problems are solved by an experienced layer-out.

The marked shell plate is then roughed to size, squared by a shearing machine, and the edges machined on a planer or cut by torches to the proper bevel or welding groove shape. The shape of a welding groove is not rigidly specified but is subject to a number of variables with which the inspector must be familiar. At this point the welding groove is checked by the inspector because cutting and trimming the plate exposes surfaces that were not accessible for examination previously. These surfaces are examined carefully for evidence of cracks, slag inclusions, and laminations. A change in cutting action of the torch may indicate the presence and location of defects.

The shell plate then goes to the press, or "breaker," or "bender." Here, the edges that are to be in the longitudinal seam of the vessel are curved to the radius of the cylindrical shell. This important step of setting the curvature in the plate edge is omitted in many shops. This omission accounts for lack of concentricity in the vicinity of the seam and consequent unfavorable stress distribution in the finished welded longitudinal seam.

After the partially formed shell is rolled to cylindrical shape, the shell is checked for curvature and out-of-roundness (ASME Code, Sec. VIII, Par. U-79). A check is also made for camber in the shell along lines parallel to the axis, which may be caused by deflection of bending rolls, and for cone shape, which may result from lack of skill in rolling.

WELDING

In the welding department, to which the shell then goes, the inspector has need for a thorough knowledge of welding procedures. There are many variables to be controlled rigidly by specification, and others, such as electrode sizes and welding-groove shapes, that can be left to the fabricator and welder. The whole welding procedure cannot be left to the welder because the skill of the metallurgist and engineer are important in specifying procedure. In other words the material to be welded and the design of the vessel affect specifications. Only the metallurgist has the tools for determining the optimum conditions for welding. If this control of variables is worked out to produce a good weld then it follows that exact repetition of operations on identical materials will reproduce the weld quality. However, if a method is beyond the skill of the available welders another method may have to be developed.

In order to be assured that approved welding procedure is used, the inspector requests of the fabricator a copy of his recorded welding procedure, asks if the method has been tested, and if so, asks for the test data. This data is reviewed to determine whether acceptable results can be produced. It must then be determined whether the welder has learned to follow the method. This is determined by securing and reviewing his test record. When welds are to be examined by means of X-ray as in the case of these shell plates, reliance on tested procedure becomes of reduced importance.

By consulting a copy of the fabricator's recorded welding procedure the details of the welding groove are checked before welding is started. (ASME Code, Sec. IX, Par. Q-101.) This procedure also gives the kind of filler metal to be used, the number of passes, the sequence of passes, the size of the electrode for each pass, and the voltage and current for each size electrode: all things that are checked to the satisfaction of the inspector as welding progresses. If the inspector's experience is adequate it may be advisable for him to see each step of welding.

Upon completion of welding, the vessel is stress relieved in a furnace (ASME Code, Sec. VIII, Par. U-76). The inspector must follow the procedure to make a satisfactory report. The shell is supported to prevent or minimize distortion during heating. The furnace is brought up to temperature slowly so that the vessel will become warmed uniformly throughout before increasing the rate of heat input to attain final temperature. A recording temperature indicator makes a graph of the heating, soaking and cooling periods thus showing the nature of the heat treatment.

After stresses are relieved, the shell is checked for out-of-roundness and excessive scaling, and the surfaces are re-examined for cracks, blisters and potential defects that may have been made visible by the heat treatment. If the shell is found to be out-of-round in excess of code requirements (ASME Code, Sec. VIII, Par. U-79) or in excess of the specification tolerances, the shell is re-rolled or reformed to proper tolerances.

The shell seam is then ready for X-ray (ASME Code, Sec. VIII, Par. U-68h). The inspector must be particularly alert for evidence of lack of fusion at the side walls of the welding groove, incomplete penetration through the plate thickness, slag inclusions, cracks, porosity, and gas pockets.

If such defects are found, the weld is chipped out, ground, or "gas-gouged" and then rewelded, stress-relieved, and again X-rayed. The joint is allowed 90% efficiency, which permits some small defects. The extent of allowable defects is nearly always subject to considerable discussion. However, there are "standard" films that illustrate acceptable welds, and with these, experience, and a mutual willingness to accept the facts the acceptability of the weld can be determined.

MACHINING

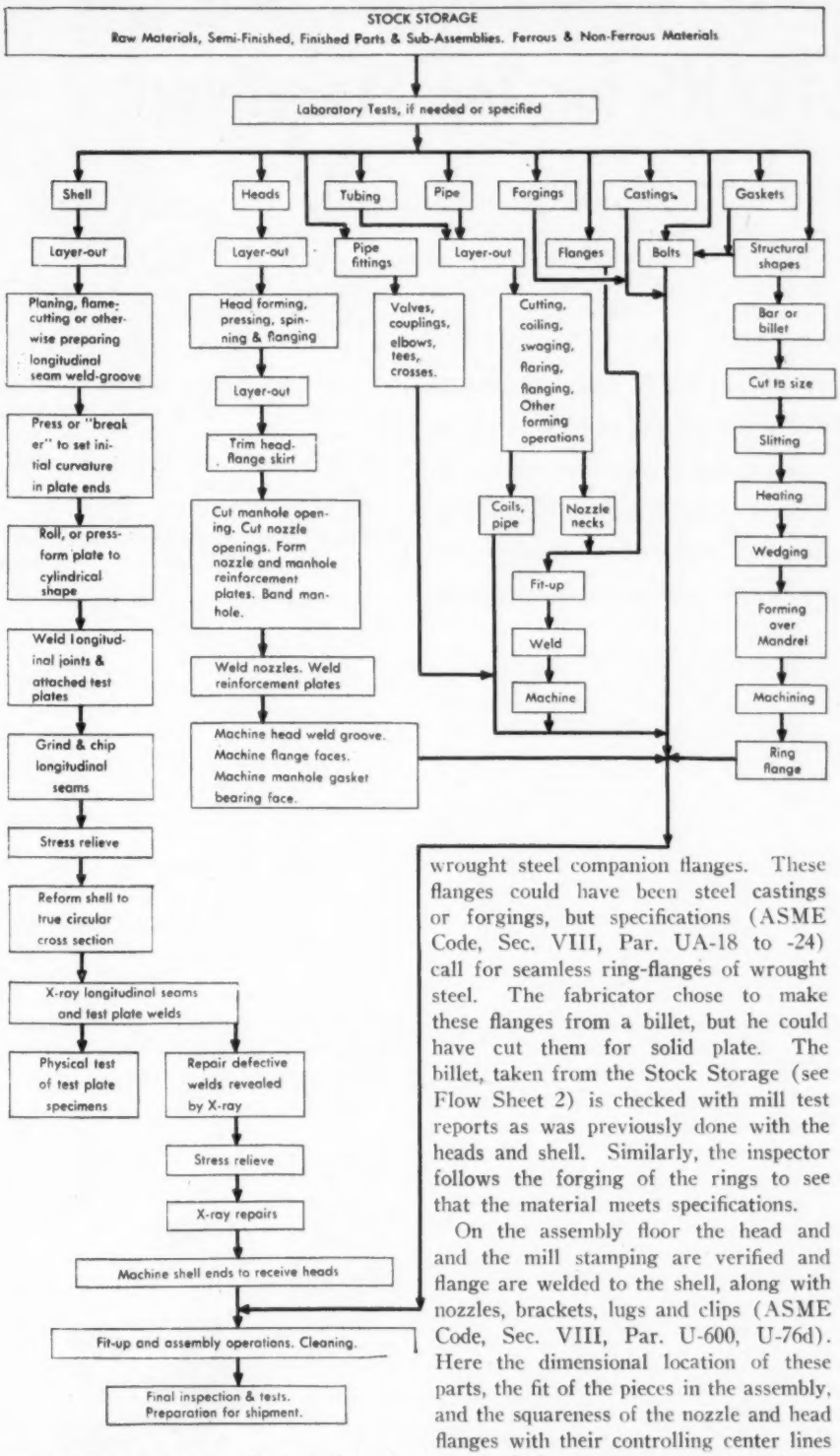
The next operation is machining the ends of the shell to make one side of a welding groove with the edges of the heads and, if there is too great a difference between shell thickness and head thickness, to taper back the thicker edge (ASME Code, Sec. VIII, Par. U-72c). The shell is then ready for the fitting of heads, nozzles, and other parts and for location recheck of these by the layerout.

Returning to Stock Storage on Flow Sheet 2, the plates for the heads are found set aside. The mill test reports are checked as before for the material, plate markings, plate thickness, and examination of surfaces for flaws. The layerout man marks the plate for trimming in the blank form and it is cut to size by shears, flame-cutting, or machining.

In forming the head blank it is dished and skirted by means of hydraulic presses and dies, or by spinning. Since the pressing or spinning operations the material to bending, tension, and compression of sufficient magnitude to reveal flaws that might exist in the material, the plate is again examined closely for possible defects. The plate thickness is rechecked, particularly at the knuckle radius of the flange, to be sure that the material has not been excessively thinned during the forming operations (ASME Code, Sec. VIII, Par. U-36, -37, -38). By means of a template the head is checked for proper curvature. The length of the straight skirt is measured so that we may know that the flange will be sufficiently long after trimming.

The location of nozzles, manholes, and other openings are rechecked prior to

FLOW SHEET 2 — Shop Processes and Operations



making any cut-outs. If a manhole is required this is the time to check its size, location, and bandings if the head thickness were not sufficient to provide adequate manhole-cover gasket bearing area, must be checked. The head is completed by machining the edge for a welding groove and rough machining the cover plate gasket bearing faces.

In fitting the head to the shell, alignment of the two halves of the welding groove is checked before tack welding or otherwise positioning the parts for welding.

In this vessel, the other end of the shell is fitted with one of a pair of wrought steel companion flanges. These flanges could have been steel castings or forgings, but specifications (ASME Code, Sec. VIII, Par. UA-18 to -24) call for seamless ring-flanges of wrought steel. The fabricator chose to make these flanges from a billet, but he could have cut them for solid plate. The billet, taken from the Stock Storage (see Flow Sheet 2) is checked with mill test reports as was previously done with the heads and shell. Similarly, the inspector follows the forging of the rings to see that the material meets specifications.

On the assembly floor the head and and the mill stamping are verified and flange are welded to the shell, along with nozzles, brackets, lugs and clips (ASME Code, Sec. VIII, Par. U-600, U-76d). Here the dimensional location of these parts, the fit of the pieces in the assembly, and the squareness of the nozzle and head flanges with their controlling center lines are checked. Bolt holes must straddle the center lines, the flange thicknesses must be right for the nozzle size under the pressure and temperature conditions of service. The materials of the flanges, nozzle, necks and reinforcing pads are checked for compliance with specifications. The welded assembly is chipped and ground at the new seams and otherwise readied for the stress-relieving operation.

Returning to stock storage again the plate for the tube sheet is examined and checked (ASME Code, Sec. VIII, Par. U-61). The materials of construction and the mill stamping are verified and procedure previously used for examining the shell plates is followed. The specifications (ASME Code, Sec. I, Par. P-249) require chamfering on both sides of the tube sheet to prevent burrs from the drilling operation, which may:

(1) Lodge between the tube wall and the tube sheet hole on the shell side of the tube sheet and prevent rolling the tube true and tight.

(2) Cut a notch in the tube on the shall side of the tube sheet during the rolling operation and eventually cause tube failure.

(3) Interfere with proper beading or flaring of the tubes on the channel box side of the tube sheet.

The walls of the tube sheet tube-holes are checked for smoothness, size, and for squareness with the tube sheet face.

The shell, with attached head and flange, is checked again after stress relief for out-of-roundness, surface imperfections, evidence of distress, or flaws that heat treatment may have disclosed. Like attention is given to the channel box head, its attached flange, and channel or division plate. The X-ray films are checked and the other precautions that were mentioned in connection with the shell inspection are observed.

So far it has been assumed that the shell was processed independently before attaching the head and flanges so that if it had been necessary to reject the shell, it would not also be necessary to lose the expense of labor and material in the head. For a similar reason it is practical to assemble the channel box and shell temporarily, blank off the nozzles, and apply a hydrostatic test as a check on the tightness of the seams and flange joints.

During operations on these members the tubes are withdrawn from stock, checked for compliance with material specifications (ASTM A-83, Sec. 15, Table 2 and ASME Code, Sec. I, Par. P-251), calipered for gauge, and checked for diameter and out-of-roundness. After the tubes have been bent and formed to final shape, they are checked for flattening at the bends, inspected for surface flaws such as cracks and mars, and assembled with the baffles and tube sheet. The tube ends are then rolled in the tube sheet, flared, and excess tube-end projection beyond the tube sheet face removed. These details are checked to see that a workmanlike job has been done and that the tube ends have not been damaged by over-rolling, rough handling and general carelessness. The tube ends must be found flared by at least the tube wall thickness at any point around the tube hole periphery, and the ends projecting uniformly and relatively smooth to minimize turbulence and pressure drop, or resistance to the flow of the fluid.

In preparation for hydrostatic test, the tube bundle assembly must be in order. Dummy or "false heads" or test

(*Turn to Page 662*)

INCENTIVE PLANS for Top Executives

by CLINTON DAVIDSON
President, Management Planning, Inc.
New York, N. Y.

WITH THE RETURN OF COMPETITIVE CONDITIONS, chemical industry owners and top management are again thinking about the problem of incentives for the men in key positions, the men who individually have most to do with determining whether the company travels along profitable or unprofitable paths. Here a well known expert on industrial management discusses the principal types of executive incentive plans and the problems involved in each.

ONE of the most serious problems confronting American business today is that of insuring proper and adequate compensation to the men who bear the burden of administration and direction. The reason is not that stockholders are unwilling to pay salaries or bonuses commensurate with results, but rather that the income taxes are so high that most of the moneys so paid out would go to the tax collector instead of the executives for whom the "incentives" are intended.

Here is the way one large-scale owner voiced the problem: "Our company's sales," he said, "are at their highest point in our history. Wages and working conditions for production employees are likewise better than ever before. But salaries and other compensation paid to officers, directors and other high executives are the lowest, in terms of sales and net worth, that they have been since 1931.

"We have examined every possible avenue of correction — bonuses, profit sharing, issuance of stock, and the like— and every course brings us up against the blank wall of income taxes. To take a specific example, we have one man who earns $50,000 now, and who is worth at least twice that much to the company. But if his earnings doubled, his actual net increase, after taxes, would be less than $12,000 a year. We are extremely anxious to find some way to pay him more, because he is seriously considering becoming a partner in a new and smaller concern.

Here is another example which shows how tax developments have vitiated ownership's desire to give management a share in the profits of business. A company, which is international in scope, has paid its managers large and liberal bonuses for a score of years, these bonuses representing a percentage of earnings. As a result of this plan, the company's former executive vice-president and general manager, who retired a few years ago, accumulated a personal fortune of more than a million dollars out of these bonuses. His percentage bonus in a single prewar year often ran as high as $200,000. Judged by such results, this particular company's bonus arrangement would seem to be ideal.

It *was* ideal in earlier days, but it almost defeats itself under today's personal income tax laws. For example, if this same general manager were to receive a $200,000 bonus today, some $148,000 would go for personal income taxes, leaving less than $52,000 for himself.

While the earnings-bonus plan still *costs the company* the same amount, the moment the general manager's compensation exceeds $100,000, approximately 85 per cent of it is consumed by taxes—and the *incentive* wholly disappears from the company's incentive plan. Proportionate "let-downs" occur in the case of executives further down the ladder.

There are two solutions to this difficulty, and both of them are difficult. The first involves a reduction in personal income taxes—and Business, for its own good and that of the country as a whole, should be doing its utmost to "sell" Congress on a substantial cut in upper-bracket taxation. The second involves the acquirement of stock ownership by top managers, which is also a complex operation.

If, at the time the earning-bonus plan described above was put into effect, the general manager could have bought a proper percentage of the company's stock, his *income* would have been reduced by present taxes, to be sure, but the assurance of *future security* for himself and family would have remained, through his stock ownership. And as long as the executive's future security remained, the major incentive would have continued to operate for the stockholders' benefit.

OBSTACLES TO ACQUIRING STOCK BY MANAGERS

There are two principal obstacles to the installation of such a stock-purchase plan. The first is the reluctance of stockholders—particularly in closely held corporations—to give up any part of their ownership interest. The second obstacle is the financial inability of the managers to buy a sufficiently large block of stock to make the managers' ownership interest worth while.

Overcoming the reluctance of shareholders to sell stock to management is basically a selling problem. Stockholders must be shown the intrinsic mutuality of interests. They must be "sold" on the benefits which accrue to *all* the owners from the efforts of the managers, when the latter are impelled by the most powerful of incentives—part ownership in the business.

Tax developments have vitiated ownership's desire to give management a share in the profits.

This selling job cannot be done by management itself. Managers who approach owners on such a question are *per se*, in a weak and self-serving position, and their arguments are too often regarded as special pleading. This is a task for the outside expert, who can

As an incentive, stock ownership is far more effective than any mere profit-sharing device.

succeed if he possesses the following specialized qualifications:

1. Unselfish interest and viewpoint.
2. Ability to gain the confidence of both parties.
3. Mature financial experience.
4. Sales experience, particularly in dealing with wealthy men.

Possession of these qualifications makes it relatively easy for the outside negotiator to "sell" a plan which meets the respective needs of the managers and the shareholders. Even apparently hopeless situations eventually yield to a solution, and, in our experience, all but about 2 per cent of such cases can be satisfactorily resolved.

SOLVING THE MANAGERS' INABILITY TO PURCHASE STOCK

With respect to the second point—the financial inability of managers to buy adequate stock interest—it must not be assumed that the only solution is for the managers to have, or be able to borrow, all the cash necessary to buy such an interest outright. If this were the only way, less than one per cent of such arrangements could be consummated. In our varied experience with such situations, we have uncovered almost as many ways for individual managers to buy a stock interest as there are ways for a corporation to acquire additional capital. For example, consider the following six solutions:

1. Stock purchase warrants.
2. Financing of the purchase by the corporations, with options entitling the corporation to repurchase at prices progressively increasing in proportion to the number of years the stock is held by the manager.
3. Stock purchase financed partly by dividends and bonus.
4. Direct purchases from controlling stockholders through part cash and part notes, with stock as collateral for notes.
5. Bank loans, endorsed by owners from whom stock is purchased.
6. Stock offered to manager at a price sufficiently lower than market price, which enables him to do his own financing by using stock as bank collateral.

Serious tax problems are involved in each of the six methods outlined above, so none should be undertaken without first securing tax advice. For example, court tax decisions have either removed most of the incentive from the stock purchase option plan or have clouded it to such an extent that few are willing to try it. In event this plan is preferred, we believe that two things should be done:

1. Interested corporations should unite in seeking proper legislation.
2. The date under which options *must* be exercised and the expiration date of the options should be at least ten years from the date they are issued, so as to give time to secure proper changes in the tax law.

Where managers, out of their private funds, are unable to finance the purchase of sufficient blocks of stock, either the corporation or the stockholdes must agree to assist them. Once again, this is a selling job—persuading stockholders that if it is beneficial to have managers *owning* stock, it is likewise beneficial to *help them own it!*

This selling job takes time, and skill and effort. However insuperable a given situation may seem at the outset, our experience in conducting such negotiations proves that every obstacle can be overcome. According to our records, less than two per cent of the cases cannot be satisfactorily solved. The following illustration shows how even the most hopeless situations are amenable to proper handling.

HOW ONE COMPLEX CASE WAS HANDLED

In this particular case, the customary conflicts of interests were further complicated by the mutual animosity of two elderly groups of stockholders. The business was being managed successfully by two executives who between them owned a very small stock interest. They were dissatisfied, first, because they could see no worthwhile future for themselves, and, second, because they were "in between" the two antagonistic stockholder groups.

The solution of this apparently hopeless problem involved two separate deals:

Step 1. When we stepped in as outside counsel, we first made a study of the company's affairs and determined upon a fair price for its stock. Then we met the two elderly family groups—in separate meetings—and pointed out to each the futility of continuing under such inharmonious conditions.

We suggested that the smaller of the two groups, which was the source of most of the strife, sell its interest for cash, and that the other group accept for their stock (1) part cash; (2) part preferred stock, and (3) part common stock.

Each group agreed to permit the two younger men, who were actively managing the business, to buy a reasonable amount of common stock. The balance of the cash required to buy the common stock was to be raised by the company through a bank loan. This common stock, after purchase by the company, was retired.

As a result of the completion of the first step, numerous benefits accrued to all concerned.

Step 2. Eighteen months after Step 1 was taken, we were asked by the management to negotiate the purchase of all of the common stock remaining outside the hands of the management (25 per cent)—all held by the second group of elderly stockholders.

An agreement to sell was reached, a price was agreed up and a 10-year corporation bank loan was arranged to finance the purchase. The company purchased and retired the stock, leaving the two managers—who once owned no part of the company—possessing 90 per cent of the outstanding common stock. The remaining 10 per cent was owned by other executives. Once again, all benefited.

If it is beneficial to have managers owning stock, it is likewise beneficial to help them own it.

As an incentive, stock ownership is far more effective than any mere profit-sharing device. The latter has a feast-or-famine quality that lowers its value in the eyes of management. Profits, as we have seen during the war years, can boom beyond the point where management itself can assume full credit for the rise—and in such periods, the incidence of taxes is also great. Conversely, in a downward turn of the business cycle, sound and aggressive management may conserve rather than build, but in any plan based on profits only, this contribution would be overlooked. But where incentives take the form of stock participation, the management which looks to the future as well as to the present receives its just reward.

CHEMISTS Foresee INDUSTRY EXPANSION at Chicago ACS Meetings

EDITORIAL STAFF REPORT

A LARGE EXPANSION IN THE CONSUMPTION of chemical products was predicted by speakers at the 110th meeting of the American Chemical Society in Chicago, September 9-13. Also apparent was the increased social consciousness of scientists as evidenced by the genuine concern over the political implications of atomic energy. Technical reports evoking wide interest dealt with fluorine chemistry, problems of food supply and nutrition, and new drugs.

THE SCIENCE and technology of atomic energy were virtually ignored at the 110th Meeting of the American Chemical Society in Chicago, September 9-13. Its peacetime applications, however, as well as the impending danger of uncontrolled atomic warfare were thoughtfully discussed before the 8900 registrants at the general meeting in Medinah Temple.

Charles A. Thomas, vice president of Monsanto Chemical Company and one of the five collaborators on the Acheson-Lilienthal Report on atomic energy control, declared that atomic power for peacetime industrial use can be produced at a cost roughly comparable with that of coal.

It is extremely probable, however, that atomic power, now in its infancy, will become cheaper as research and development progress, while at the same time the general trend of coal prices is upward. "It seems reasonable to expect," he said, "that the future development of nuclear power will result in the standardization of design and construction and a material reduction in the investment and operating costs."

Dr. Thomas cited three broad advantages of nuclear energy: since a nuclear plant uses up a relatively small quantity of fuel, industry can be decentralized—proximity to coal or oil fields will no longer be necessary; a nuclear plant in combination with a gas turbine will aid in the industrial development of isolated parts of the world where the cost of oil, gas or coal is prohibitive and where a large supply of water is unavailable; a nuclear plant, together with a gas turbine, might be desirable as an operating or standby facility in connection with existing large utilities, especially since—unlike hydro-electric plants—the nuclear plant can supply process and heating steam directly in addition to power.

Nuclear energy, in spite of its present higher cost, has advantages and possibilities not attainable with ordinary sources of power. For the immediate future, at least, it should not be regarded as competitive with but rather supplementary to existing facilities.

ATOMIC WARFARE

Bradley Dewey, president of the American Chemical Society and member of the Joint Chiefs of Staff Board and the Presidential Commission to evaluate the results at Bikini, deplored the sensational publicity—some of it purveyed by ordinarily responsible scientists—which led the public to expect more astounding results than were obtained at Operation Crossroads. Notwithstanding the fact that the target vessels were deployed in such a manner as to prevent total destruction, and the further fact that the bomb lived up to all expectations, the relatively unimpressive "box score" has lulled many Americans into a false underestimation of the bomb's lethal potency. Many are saying that it is "just another weapon" which does not materially change the concept of war.

It is a military axiom that for every weapon there is a defense. If that axiom characterizes weapons of war, then the atomic bomb is not "just another weapon," for no positive defense against atomic destructiveness is possible, now or ever, according to Colonel Dewey. "We can run away from the bomb and we can burrow in the earth and we can erect massive shelters of concrete and steel. And of course there will be methods of evasion. Bomb-carrying planes can be shot out of the skies. The factories that make them can be destroyed. But I am sure that none of us relishes relying on these negative defenses for our country. . . . Science will not today, tomorrow or ever, find a strong, tough and light material which will shelter men, or munitions plants, or dock yards from the effects of the atomic bomb. Science, which in the last war produced gas-tight clothing and fabrics which would absorb deadly gases, cannot give us garments to protect us from radioactivity of the atomic bomb."

Civilization need not be destroyed, even in the event of atomic war, thinks Dewey. "Look at Germany today, loser in a long war. Look at her battered cities, her worn-out economy, her miserable, starving people on their impoverished fields. And look at England, victor in a long war—at her battered cities, her undernourished women and children, her broken, worn-out factories. . . . What does seem to me important . . . is the fact that the atomic bomb will surely make any war shorter than those of the past. . . . It could mean . . . wars less destructive to our civilization. The atomic bomb exists. We must face this fact squarely. And we must face the fact that it exists for evil or for great good—to make horrible war still more horrible or to put a final stop to war. To me this brings us to a simple reality: A nation sure of its own freedom from the temptation to wage aggressive war, which has a supply of atomic weapons and the means—airplanes, rockets, or guided missiles—to deliver them, can rest assured that any other nation will hesitate to wage war against it with or without atomic bombs. It can very well be that such a nation can, by its mere possession of atomic weapons, insure the peace of the world."

ATOMIC CONTROL

The problem of obtaining the benefits of atomic energy and at the same time preventing the disaster of atomic warfare was discussed by David E. Lilienthal, chairman of the Tennessee Valley Authority, co-author of the Acheson-Lilienthal Report, and potential appointee, according to rumor, to the directorship of

the atomic energy control board provided for by recent federal legislation.

Our position was likened to that of a man who has never broad-jumped more than 10 feet. But "if a deep chasm lies before him, and something pretty hungry is chasing him, then twenty feet is still 'one hell of a jump'—but because he has no easy alternative, it's not impossible."

"A Report on the International Control of Atomic Energy" was published by our Department of State a few months ago, the basic tenets of which have been presented to the Atomic Energy Commission of the United Nations by Bernard Baruch, the United States delegate. This report represented the work and the unanimous agreement of a Board of Consultants of five men, consisting of Chester Barnard, president of the New Jersey Bell Telephone Co.; Dr. Robert Oppenheimer, wartime director of the Los Alamos atomic plant; Harry Winne, vice-president of General Electric Co. in charge of engineering policy; Dr. Charles Thomas; and Mr. Lilienthal.

These men—all of them widely experienced and responsible in scientific and technical matters—were asked to come up with an answer to something quite foreign to their training: a "political" problem. Political and scientific methods, Lilienthal explained, are diametrically opposed. "The political method, generally speaking, is based on the process of *first* deciding what answer you and your side wants, and *then* scurrying around for evidence and arguments and public opinion and force to support the answer you started with in the first place. . . . Its practitioners sometimes include business, labor and farm leaders, as well as politicians and statesmen—even once in a while a scientist. And when a scientist goes in for political dogmatism, he can make a politician look scientific by comparison!"

These men, then, tried to reject all preconceived solutions and to examine the facts objectively—trying, in short, to solve a political problem by the scientific method. They rejected outlawing the atomic bomb by international agreement. "The nations would all go through the process of signing their names to a treaty. . . . Well, how much security—how much peace of mind would anyone get out of that? Mighty little. . . . We concluded . . . that . . . an agreement by each nation to outlaw the bomb might even be worse than nothing at all. For it would create suspicion and fear as to what the other fellow is doing behind closed factory doors and in hidden and secret laboratories and bomb plants; and fear and suspicion breed wars."

Similarly rejected was the proposal that the nations agree to crack down on anyone who violated the international agreement. "We . . . could find precious little security in a plan to punish a nation *after* it had dropped hundreds of bombs and killed millions of human beings."

Charles A. Thomas, vice-president of the Monsanto Chemical Co., and David Lilienthal, Chairman of TVA. Dr. Thomas and Mr. Lilienthal are members of the five-man Board of Consultants to Bernard Baruch, U. S. delegate to the Atomic Energy Commission of the UN.

Another proposal was that of an international inspection agency; but the Board could derive little comfort from that suggestion. "In a race between a nation that has scientists trying to design new kinds of plants so the international inspector wouldn't recognize them, and an army of inspectors looking for the only kind of plants they know, which are yesterday's plants, in that kind of race the inspectors probably wouldn't have much chance."

The means finally agreed upon was a world Atomic Development Authority—not a mere international detective force, but a development agency engaged in operations and extensive research.

GERMAN CHEMICAL INDUSTRY

Recognition was given to several outstanding American chemists at the general assembly. The Francis P. Garvan Medal honoring women in chemistry was presented to Dr. Icie Macy Hoobler, of Detroit, research director of the Children's Fund of Michigan and an authority on nutrition and child growth. The $1,000 American Chemical Society Award in Pure Chemistry, sponsored by Alpha Chi Sigma, was given to Professor Charles C. Price III, head of the chemistry department at the University of Notre Dame. The Eli Lilly and Company award of $1,000 and a bronze medal was presented to Dr. John D. Ferry, assistant professor and research associate in the chemistry department of the University of Wisconsin.

The Priestley Medal, highest award in American chemistry, was presented to Professor Roger Adams, head of the University of Illinois chemistry department and chairman of the Society's Board of Directors.

In his acceptance address, Dr. Adams gave his views on what should be done with the German chemical industry. He contended that a strong German industry is vital to the economy of Europe. "It is better in my opinion to have Germany attain a balanced economy, even if a much larger proportion of German war potential industries must be retained than is now planned. Proper control of such industries by competent representatives of the four occupying powers, perhaps over an indeterminate period, would then be a 'must.' Without a balanced economy in Germany, the future economy of Europe is at stake."

He deplored the crippling curtailment of Germany's heavy industry, the most vital part of the country's prewar industrial life, and the Allies' delay in carrying out the terms of the Potsdam agreement to treat Germany as an economic unit. As a result, havoc has been wrought in all four occupation zones. "The drastic conditions of economic life stemming from the firmly maintained trade barriers are too apparent for contention. There appears to be no firm basis for the future reestablishment of a normal non-aggressive state, willing and eager to earn its way back to acceptance into world accord."

He cited the low production—only 29 per cent of capacity—in the American zone, blaming the red tape involved in getting materials from other zones, low worker efficiency due to lack of food, and the encumbering rules and regulations of the military government which interfere with normal functioning.

Having lost much of her former trade, Germany must, with her characteristic cleverness, find new products for the world market. So far no postwar patent policy for Germany has been determined, but any regulations which are essentially confiscatory of all future German patents would, Adams argued, influence German scientists not to disclose any discoveries of potential industrial value. "The stimulus to new discoveries leading to the

balanced economy will be effectively thwarted."

PAPERS

Of the more than 700 papers presented at the meeting, only a few of the highlights can be presented here.

Of major interest to industrial chemists and chemical engineers were the papers on fluorine chemistry presented before the Symposium on fluorine chemistry sponsored by the Division of Industrial and Engineering Chemistry. This vast and potentially important field was explored from the preparation and handling of elemental fluorine gas to the synthesis and properties of complex fluoro-organic compounds. The highlights of this symposium will be presented in a forthcoming issue of CHEMICAL INDUSTRIES.

Another paper, presented before this Division by Donald F. Othmer and Sidney A. Savitt, of the Polytechnic Institute of Brooklyn, promised cheaper nicotinic acid, an essential constituent of the vitamin B complex, by azeotropic separation of β-picoline from other alkylated pyridines by the use of phenol.

Chemists of the American Cyanamid Co., J. H. Paden, K. C. Martin and R. C. Swain, described a new plant-scale process for making nitroguanidine, used extensively during the war as a flash preventive in the firing of anti-aircraft and naval guns. The intermediate, guanidine nitrate, was derived from dicyandiamide and ammonium nitrate, heated under pressure in anyhydrous liquid ammonia. The latter material is often used as a solvent and reaction medium in laboratory-scale work, but the described operations are believed to represent the largest installation involving its use.

Speaking before the 25th anniversary dinner of the Petroleum Division, Bruce K. Brown, vice-president of Standard Oil Company of Indiana, opined that petroleum would have little to fear from atomic energy as a competitive source of power. He foresaw a steady increase in the consumption of petroleum, both as a fuel and as a raw material for organic chemical materials. He disparaged predictions of early exhaustion of our petroleum reserves, citing the huge stores of shale oil and the large quantities of natural gas which can be converted by the Fischer-Tropsch process into petroleum-like products. "If we were to draw from only one-third of our present known gas reserves at the rate of 4 per cent per annum, we could produce 500,000 barrels of gasoline a day."

He acknowledged that another war might upset the best predictions, especially on account of the trend away from internal-combustion motors for aircraft to the faster but more wasteful jet propulsion. He also noted the trend away from high-octane gasolines to Diesel fuels.

Barring a depression, the next five years will see a largely increased use of petroleum products, Dr. Brown asserted, citing the following estimates: gasoline, 25 per cent; kerosene, 7 per cent; lubricants, 20 per cent; asphalt, 35 per cent; liquefied petroleum gas, 25 per cent; distillate fuels for home heating, 75 per cent; and Diesel fuels, 100 per cent.

The Rubber Division heard J. J. Keilen and Arthur Pollak, of the West Virginia Pulp and Paper Co., describe new lightweight rubbers as tough and strong as heavier types made by the incorporation of lignin as a reinforcing pigment. The lignin is mixed with natural or synthetic latex and coprecipitated with the rubber. It is lighter in weight than carbon black, the usual reinforcing agent, allows the production of light-colored rubbers, and reduces the milling time, according to the authors.

Another process, for producing a GR-S rubber of low water absorption, was revealed to the Rubber Division by J. C. Madigan *et al.* of the United States Rubber Co. It was discovered that water absorption of ordinary rubber was traceable to the "creaming" process, leading to the occlusion of soap and water-soluble ash. This was eliminated by using a new method of coagulation, whereby the latex is strongly agitated by compressed air under the surface of a dilute acid solution in the presence of glue to prevent excessive tackiness. It has been found that the acid-glue coagulated copolymer, GR-S 65, is superior to previous types of GR-S with respect to water absorption during extended immersion, insulation resistance, specific inductive capacity and power factor stability.

A method of producing lactic acid from sulfite waste liquor was described by the University of Wisconsin Biochemistry Department's R. H. Leonard and W. H. Peterson. Steam stripping of the liquor to remove sulfur dioxide, neutralization with slaked lime and filtration of the calcium sulfite, and regulation of the acidity with carbon dioxide prepared the liquor for the 40- to 48-hour fermentation. The fermented liquor usually contained 1.8 per cent of lactic acid. Concentration to 6 per cent followed by extraction with suitable solvents, such as amyl alcohols, gave a product of 90 per cent purity with 2 per cent water and 8 per cent nonvolatile impurity. A single pulp mill producing 100 tons of pulp daily in a 300-day year could make 9,000,000 lbs. of lactic acid annually at a cost of 3.4 cents per pound of acid recovered for raw materials and steam. Profitable utilization of the residual lignin would, of course, reduce the raw material cost.

Improved silica gel catalysts for the synthesis of butadiene from alcohol were described by W. M. Quattlebaum, W. J. Toussaint and J. T. Dunn, of Carbide and Carbon Chemicals Corp. It was discovered that the basic reaction involved two steps: first, the acetaldehyde, derived from alcohol, is converted to crotonaldehyde; second, the crotonaldehyde reacts with alcohol to give butadiene. Silica gel proved to be an effective catalyst for the second step of the reaction, but not until it was treated with tantalum oxide did it promote the first step as well. The purity of the final butadiene (98 per cent) was higher than that reported previously from processes using alcohol as a starting material. It was also found that other aldehydes and ketones can be converted into useful unsaturated hydrocarbons by alcohols in the presence of silica gel catalyst.

The millions of dollars spent annually by the petroleum industry to replace corroded oil well equipment may be largely saved by the discovery, reported by Professor N. Hackerman and D. A. Schock, of the University of Texas, that naphthenic acids and chromates form a protective film on metal in contact with crude oil.

Of special interest to biological chemists were several reports dealing with foodstuffs, nutrition and therapeutic agents.

Robert T. Baldwin (left), treasurer of the American Chemical Society and secretary of the Chlorine Institute, and E. H. Volwiler, vice-president of Abbott Laboratories.

Fertilizer Industry as a Consumer of Chemicals

by MAURICE H. LOCKWOOD, President
National Fertilizer Association, Washington, D. C.

THE FERTILIZER INDUSTRY has long been a large consumer of chemicals, the ton volume doubling within the last ten years. Changes have also been made in the form in which the plant food is supplied. For example, ammonium nitrate which previously represented a minor part of the total nitrogen fertilizers sold, now represents 20% of the supply.

THROUGH the fertilizer industry, agriculture in the United States purchases over thirteen million tons of chemicals. For the year ending June 30, 1947, prospects are that a fourteen million ton total will be required; 91% more ton volume and 103% of the three major plant nutrients than the average during the five years from 1935 to 1939.

Dollars spent nationally each year for fertilizers closely reflect the farm income during the preceding year. Neither ton volume nor the quantity of plant nutrients follows the dollar sign, however. The 1921 and 1937 records show that in each of those years the dollars spent by agriculture in the United States for fertilizers was approximately 253 million, yet in 1937 those dollars secured more than twice the quantity of plant food procured in 1921.

This shift was due to the change from higher to lower cost materials. One change was in nitrogen sources, away from natural organics to lower unit priced inorganic chemicals. Another was the increase in plant food content of fertilizer. These trends are continuing.

While the North Central States and the West Coast areas have made the more spectacular gains in fertilizer use recently, most other sections of our country have also increased their use. New construction of facilities to produce more fertilizer materials and others with which to process and distribute them are largely aimed at the Mid-west and West Coast. But even the older, sometimes referred to as "more mature" fertilizer using areas are re-equipping and expanding their chemical fertilizer plants more rapidly than is realized.

SUPPORTING FIGURES

During the five-year prewar period from 1935 to 1939, agriculture in the United States used an average volume of seven and one-third million tons of fertilizer annually. By 1945 this had increased 81 per cent to thirteen and one-fifth million tons. During that same span of years the content of the major plant nutrients in that tonnage increased 86%.

When the supply and demand for fertilizer strike a balance again, there will be a shaking out of the distribution pattern not possible during the restrictions of the war years. The assimilation of war-built nitrogen fixation plants into our peacetime economy has begun. The construction and operation of phosphate mining and processing facilities is well started. It will continue with emphasis on ability to serve the recently enlarged demand in the North Central and West Coast areas. As Europe recovers, the prewar practice of importing potash to complement domestic production is likely to be renewed.

Nutrient elements other than nitrogen, phosphorus and potassium will come to the fore as their sound place in plant nutrition is better understood. Calcium and magnesium, boron and manganese are already in the picture in fair volume. Sulphur, zinc, cobalt, copper, iron and others also have their places.

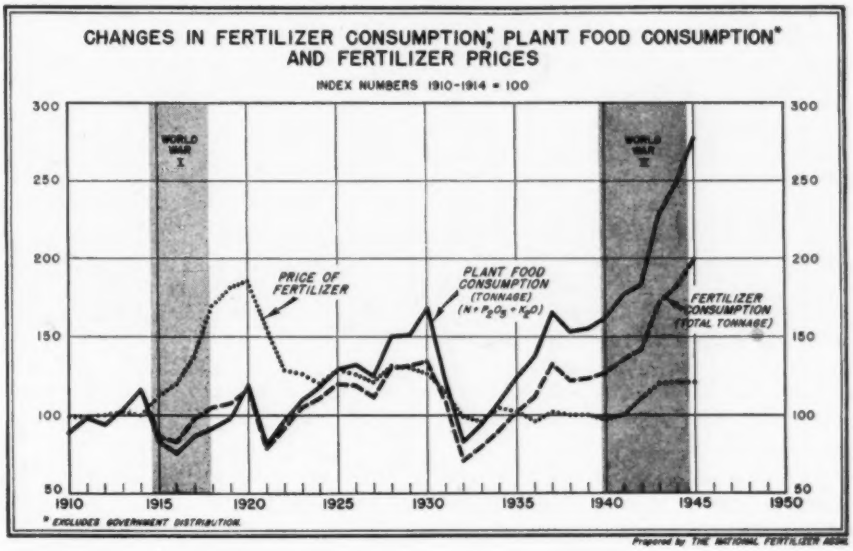
Soil and plant tissue testing will gain more general acceptance and use. Trained specialists will gain hard-earned recognition in the field of fertilizer usage recommendations. Back of this field, Bray, Truog, Spurway, Hester, Hoffer, Morgan and Peech are but a few of the leaders who have already contributed substantially to methods and practices along that line.

The field of preventive practice in this direction has only begun. Some of this may seem a long way from the major interest. But it is not. Even though such practices are not yet, nor may ever be an exact science, substantial progress in technique and knowledge has been made during the past ten years. Such general usage as is now evident in Illinois and North Carolina, for example, is but a symptom of approaching maturity for this branch of agricultural chemistry which bids fair to increase the efficiency as well as the quantity of fertilizers used. These factors cannot avoid a constructive affect on the market for chemicals.

With transportation costs, as well as labor costs, increasing and likely to remain higher than in the past, repeated studies of means for reducing the costs on the farm of production supplies are in order.

NITROGEN

Long strides have already been made in this direction. From an industry using large proportions of natural organic by-products, in less than a generation



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Presented at Meeting of Chemical Market Research Association on September 17, 1946, at New York, N. Y.

TABLE 1. FERTILIZER NITROGEN—USED IN THE UNITED STATES

Total—In Mixtures and as Materials, Combined

Form	*1925*	*1940*	*1946-'47*
	%	%	%
Solid Nitrates	39	32	18
Solid Ammonium Salts	31	35	46
Natural Organics	25	12	4½
Synthetic Organics	5	8	6½
Ammonia and its Solutions	0	13	25
Total	100	100	100
Quantity Index	100	150	257

fertilizer manufacture has changed to a predominant use of inorganic chemicals. Even as long ago as 1925 only one-fourth of fertilizer nitrogen used in the United States was from natural organics. By 1940 this proportion had decreased to one-eighth. For the year ending next June 30th this will decline to less than one-twentieth. Conversely ammonia and its solutions which in 1925 had as yet assumed no measurable per cent of the fertilizer nitrogen supply picture, had claimed one-eighth of the market by 1940. They bid fair to make up one-fourth of the total this year. Solid ammonium nitrate, of which little or none was used as fertilizer in this country in 1925, has now assumed one-fifth of the market.

PHOSPHORUS

Phosphates in the fertilizer industry have also undergone changes. Phosphate rock recovery processes and volume have been stepped up. Fused phosphates have recently entered the picture and will apparently amount to about one hundred thousand tons of material for the current year.

While tank-car shortages limit the completely free movement of sulphuric acid, and therefore inhibit the possible full production of ordinary analysis, superphosphate, new capacity for concentrated superphosphate production is under construction in both the Southeast and Northwest. The total fertilizer phosphate scheduled production this year promises to reach a new high of approximately one and one-half million tons of phosphoric acid, more than twice the prewar five year average.

The basic soundness of the relatively simple process of treating ground phosphate rock with sulphuric acid will still retain the larger part of the total phosphate market in fertilizers for that process. In spite of the fact that the Southeast appears to be over-capacitated for the production of this type of material, some new, modern production units are being installed there, following cost studies which indicate that even in old well developed areas there remains room for higher efficiency and venture capital which does not recognize so-called maturity in such a section as a synonym for industrial senility.

Concentrated superphosphate production will apparently out-strip any previous record as far as this industry's production is concerned. Some phosphoric acid as well as anhydrous ammonia will be used for fertilizer purposes in irrigation water in the West.

The ordinary superphosphate alone being produced this year will call for about 7,500,000 short tons of 50° Bé. sulphuric acid. This acid in turn called for something more than 1,400,000 short tons of sulphur equivalent. In addition to these materials substantial amounts of phosphoric acid and elemental phosphorus are used in the production of double superphosphate.

POTASH

Notation that potash materials used by the fertilizer industry currently exceeding one and a quarter million tons for the year, gives a genreal conception of the magnitude of the three groups of raw materials that go to make up the so-called major nutrient supplies.

The liming materials which furnish calcium and magnesium as well as act as soil sweeteners should not be forgotten. Most of the liming materials are applied direct to the land and, except in the use in the fertilizer industry of magnesian limestone in its products, it would be presumptuous to claim the millions of tons of that class of material which plays such an important part in sound agricultural practices.

This vital chemical industry furnishing food for plants currently accounts for $500,000,000 in annual volume. There are numerous possibilities in the volume and the challenges it may hold forth as we look ahead.

TABLE 2. LONG TONS OF PHOSPHATE ROCK PRODUCTION AND DOMESTIC USE IN THE UNITED STATES

Source	*1925*	*1940*	*1945*
Florida	3,281,560	3,186,413	4,238,228
Tennessee	536,731	1,113,684	1,294,297
Idaho, Montana, Utah and Wyoming	81,347	182,926	274,198
Total Domestic Rock Production	3,899,638	4,483,023	5,806,723
Apparent Domestic Consumption	2,928,077	3,644,656	5,458,815
Volume Index	100	124	186

TABLE 3. PRODUCTION OF SUPERPHOSPHATES IN THE UNITED STATES—TONS OF P_2O_5

Types	*1929*	*1934*	*1939*	*1944*	*1946-47*
Ordinary	710,700	477,500	632,600	1,213,100	?
Double	34,900	31,300	125,500	126,500	?
Total	745,600	508,800	758,100	1,339,600	1,500,000
Volume Index	100	68	117	180	201

TABLE 4. POTASH CONSUMPTION IN THE CONTINENTAL UNITED STATES, CALENDAR YEARS

(Short Tons of K_2O)

Class of Material	*Percent of Total* 1925	1940	1945
60% Muriate of Potash	7.4%	69.2%	78.5%
50% Muriate of Potash	34.9%	20.5%	8.8%
Sulphate of Potash	14.5%	7.0%	5.2%
Sulphate of Potash-Magnesia	.....	0.3%	2.5%
Manure Salts and Kainite	43.2%	3.0%	5.0%
Total K_2O Volume Trend	100	152	269

(Data for this table furnished by the American Potash Institute.)

INSPECTION

(Continued from Page 655)

flanges are used temporarily to attach the tube bundle to the channel box and hydrostatic pressure is applied to the inside of the tubes. While under pressure, the tube ends are examined for tightness in the tube sheet and for any evidence of cracks, splits, or other defects along the length of the tubes. Subsequently, the specified air-ammonia test is applied.

The inside surfaces of the shell and channel box are scraped to remove loose scale, dirt, and weld spatter and the balance of the scale removed by sand blasting as specified for this vessel. After fitting dowel pins to assure proper assembly of the tube bundle and channel box, installing jack screws to assist in removing the tube bundle at some future date, and finishing the drilling, tapping, and miscellaneous machine work, the final assembly and hydrostatic test is made.

Upon completion of the final tests, the vessel is stamped with the prescribed legend and data (ASME Code, Sec. VIII, Par. U-64, -65, -66); nameplate is attached, and the construction data sheet checked for correspondence with the actual vessel. If the data are found correct and in agreement with the finished vessel, the sheets may then be signed by the inspector and by all interested parties.

To finish the job, the inspector sees that threaded openings are greased to prevent rusting and difficulty in removing the pipe plugs and caps that are applied respectively to female and male openings for protection of the threads during shipment; as well as to help keep out dirt and water enroute. Machine finished surfaces of flanges are coated with grease or other rust inhibitor and covers bolted to them to minimize scratching and damaging the gasket faces. Other exposed external surfaces are given a priming coat and the vessel is loaded, blocked, braced, tagged and started on its way to the job site for installation. In the future the inspector may follow the vessel to the erection site and continue checking, testing and inspection during operation, maintenance, and repairs as indicated by Table I.

Services and Publications of the FEDERAL RESERVE SYSTEM, S. E. C. and TREASURY DEPARTMENT

by WALTER W. CHADBOURNE, Manager
Economic Research Division, Hercules Powder Company
Wilmington, Delaware

NOT LIMITED TO FINANCIAL DATA, these three agencies provide statistics and information on chemical production, general business activity, corporation plans and products, individual commodity studies, tariff rates, and many other related subjects.

THE AREA and scope of economic activity within which the chemical market research analyst pursues his investigations cannot be narrowly delimited. Broadening and intensifying the sale and consumption of the products of the chemical industry must be promoted with reference to general economic trends. Although markets for individual products usually rise or decline with the consumption potential of a particular end product or an industry, caused by a shifting of consumer buying patterns or changes in export outlets, there are always present the broader economic considerations that cannot be overlooked in any final decision of marketing policy. There is a considerable borderland between economic and market analysis where the statistics of government fiscal agencies are very useful.

Therefore, the purpose of this article on the Federal Reserve System, the Securities and Exchange Commission, and the Treasury Department, is to catalog and describe the sources of information available from these agencies. Certainly it is not implied that market research can be transformed by a switch of the button into economic analysis. Probably most of the banking and financial statistics published by the named agencies fall outside the nebulous bounds of market research. Certain other data, however, may be useful or imperative. It is the purpose of these articles to bring such situations into view and examine their sources of information.

FEDERAL RESERVE SYSTEM

The Board of Governors of the Federal Reserve System, the Federal Advisory Council, the Federal Open Market Committee, and the twelve Federal Reserve Banks with their branches, comprise the central banking structure of the United States. Broadly speaking, these central agencies and the member banks (nonmember banks may participate in the check clearing and collection functions) make up a "system." Limitation of space precludes any elaboration on the genesis and history of the Federal Reserve law or on the nature of its banking functions. The literature on the system is voluminous. Perhaps the best short description is a publication of the Board itself entitled *The Federal Reserve System—Its Purposes and Functions*, 1939. The accompanying organizational chart, while not official, gives an adequate picture of the structural shape of the central agencies and their member bank service and supervision.

The Federal Reserve Building, at Constitution Ave. and 20th St. in Washington, D. C., houses the national administrative headquarters of the Federal Reserve System.

DIVISION OF RESEARCH AND STATISTICS

Of primary interest to those engaged in economic and market research are the extensive data compiled by the Federal Reserve Board's Division of Research and Statistics and published in the *Federal Reserve Bulletin* and in special studies. This division was headed by Dr. E. A. Goldenweiser from 1926 to 1946, when he was succeeded by Dr. Woodlief Thomas, who had held the position of Assistant Director since 1934. Occupying the positions of Assistant Director at the present time are Ralph A. Young, Chandler Morse, and J. Burke Knapp. Over the years, the division's staff has assembled an impressive body of statistical data on banking, volume of money, deposit turnover, foreign exchange rates, money rates and bond yields, department store sales and stocks, and industrial production. The monthly *Federal Reserve Bulletin* is the published source for these and other series. A complete tabulation of past figures on money and banking was published in November, 1943, under the title *Banking and Monetary Statistics.* In the June, 1946, issue of the Bulletin there appeared a completely revised index of department store stocks for the United States as a whole and by Federal Reserve districts. The monthly seasonal factors used are tabulated and the indexes are shown monthly from January, 1919, to date. A similar revision of department store sales appeared in the June, 1944, Bulletin.

An outstanding feature of Federal Reserve publications is the chart book. This book of charts (March 1946 edition) is so arranged that current data on banking, money rates, and business conditions can be kept up to date by plotting the figures published in the monthly Bulletin.

INDEX OF INDUSTRIAL PRODUCTION

Perhaps the most widely used measure of industrial activity in the United States is the Federal Reserve Index of Industrial Production. The index has been subject to considerable criticism from time to time, particularly of late, due to a more extensive use of man-hour data combined with assumptions of labor productivity.* Prior to the 1943 revision, only a minor part of the total index reflected the use of a man-hours measure of production. However, the revised index (the actual revision was carried back to January, 1939) gave increasing weight to the man-hours measurement, as machinery, automobiles, ship-building, aircraft, chemicals, explosives and ammunition, and rubber products became such a large segment of total industrial production during the war.

In spite of alleged imperfections, the individual, group, and combined indexes constitute tools that can be extremely useful under certain conditions in market research problems.

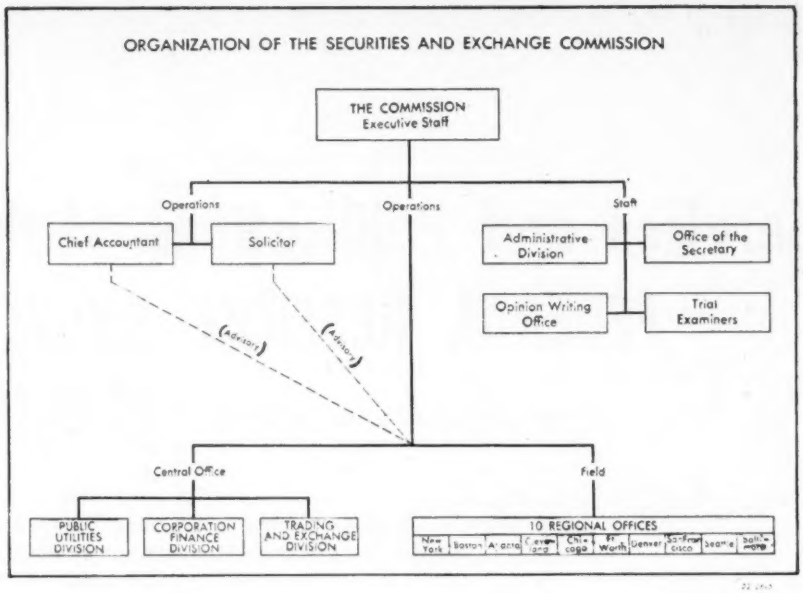
The combined index is made up of ninety-nine individual series, of which thirty-one are in durable goods manufactures, fifty-nine in non-durables, and nine in minerals. The individual series are combined into sub-groups and into a combined index on the basis of constant conversion factors which represent the value added by manufacture during 1937. Monthly indexes are published on both a seasonally adjusted basis and without seasonal adjustment. The most recent comprehensive treatment of the structure of the index can be found in the October, 1943, *Federal Reserve Bulletin,* pp. 940-984.

THE CHEMICALS INDEX

Prior to the 1943 revision, the only published Federal Reserve index relating to the chemical industry was entitled "Production Of Chemicals." With the revised index, a division was made which gives separate series for paints, soap, rayon, industrial chemicals, explosives and ammunition, and other chemical products. The index for the entire group is called Chemical Products, and it is not strictly comparable with the Production of Chemicals index which terminates with December 1938. Up to the present time the new series for Other Chemical Products and for Explosives and Ammunition have been considered confidential and have not been published.

FOREIGN EXCHANGE RATES

The weekly and monthly releases of foreign exchange rates by the Board of Governors of the Federal Reserve System are used officially by the customs administration. The daily noon buying rates for cable transfers in New York City are supplied by the Federal Reserve Bank of New York. The Federal Reserve figures are averages of the weekly and monthly data.



LIBRARY

The Library, which was 43,000 volumes and pamphlets, specializes in the field of monetary and banking history and policy in the United States and foreign countries. Some of its special collections are: complete history of the Federal Reserve System legislative history and hearings affecting money and banking since 1913 State Banking department reports for a 30 year period, annual reports, balance sheets and publications of foreign central banks; foreign monetary and banking laws; statistical yearbooks of foreign countries. The Library receives currently about 1500 economic and financial periodical publications; this includes about 600 items from 43 different foreign countries. Over 500 of these periodicals are kept permanently.

FEDERAL RESERVE BANKS

Much valuable information is contained in the publications of the twelve regional Federal Reserve Banks. Through their research departments, these banks have become excellent sources of factual data on business conditions in their respective districts and trends in the agricultural and manufacturing activities that are locally important. Each of the twelve banks publishes a monthly survey of business conditions, copies of which may be obtained free of charge from each individual bank. In addition, at least three of the banks—Chicago, Cleveland, and Dallas—are issuing a special agricultural bulletin. At irregular intervals, interesting studies are released on special situations. Examples of such bulletins

* The reader may get the outline of this controversy by reading the following: *Production of Industrial Materials in World War I and II,* Geoffrey H. Moore, National Bureau of Economic Research, Inc., N. Y., (Occasional Paper #18: March 1944,) especially pp. 31-52; "Appraising the Federal Reserve Index," an article by Frederick W. Jones and Anita R. Kopelson, in the June, 1946, issue of the *Business Record* (National Industrial Conference Board, Inc.,) pp. 223-225; and a "Statement on Federal Reserve Index of Industrial Production," *Federal Reserve Bulletin,* May, 1946, pp. 472-473.

are: *Growing and Marketing of Flue Cured Tobacco,* Federal Reserve Bank of Richmond; *Wheat Farming, A Look Ahead,* Federal Reserve Bank of Minneapolis; *Cigar and Tobacco Industry,* and *Canning and Preserving Industry,* Federal Reserve Bank of Philadelphia. Many worthwhile articles on economic trends in the South have appeared in the *Monthly Review* of the Federal Reserve Bank of Atlanta. A market research specialist should not overlook the possibility of obtaining information of value by contacts with the departments of research and statistics of these banks.

There follows a listing of the titles of the twelve monthly business surveys:

Atlanta	*Monthly Review*
Boston	*Monthly Review of Industrial and Financial Conditions in the New England District*
Chicago	*Business Conditions, Seventh Federal Reserve District*
Cleveland	*Monthly Business Review*
Dallas	*Monthly Business Review*
Kansas City	*Monthly Review*
Minneapolis	*Monthly Review of Agricultural and Business Conditions*
New York	*Monthly Review of Credit and Business Conditions*
Philadelphia	*Business Review*
Richmond	*Monthly Review of Financial and Business Conditions*
St. Louis	*Monthly Review*
San Francisco	*Monthly Review of Business Conditions*

SELECTED CHECK LIST OF PUBLICATIONS

Inquiries regarding the publications listed below should be directed to the Division of Administrative Services, Board of Governors of the Federal Reserve System, Washington 25, D. C.

Weekly

Condition of the Federal Reserve Banks
Condition of Weekly Reporting Member Banks in Central Reserve Cities
Condition of Weekly Reporting Member Banks in Leading Cities
Department Store Sales, by Cities
Weekly Department Store Sales
Weekly Foreign Exchange Rates
Weekly Review of Periodicals

Semimonthly

Deposits, Reserves, and Borrowings of Member Banks; Deposits of Country Member Banks

Monthly

Federal Reserve Bulletin, $2.00 per annum
Bank Debits—Debits to Deposit accounts Except Interbank Accounts
Business Indexes
Consumer Credit
Foreign Exchange Rates
National Summary of Business Conditions
Open-Market Money Rates in New York City

Semiannually

All Banks in the United States — Principal Assets and Liabilities

Annually

Annual Reports
Bank Debits—Debits to Deposit Accounts Except Interbank Accounts

Special Reports

Federal Reserve Act, as amended to October 1, 1935. Paper bound edition. 50 cents.
Digest of Rulings—to October 1, 1937. 683 pages. $1.25.
Banking Studies. August 1941. 496 pages. $1.50.
Banking and Monetary Statistics. November 1943. 979 pages. $1.50.
Chart Book I, Federal Reserve Charts on Bank Credit, Money Rates, and Business. March 1946. 60 pages. 50 cents.
Postwar Economic Studies (8 pamphlets being issued at irregular intervals.) Set of eight pamphlets $1.25; 25 cents per pamphlet.

No. 1 Jobs, Production, and Living Standards.
No. 2 Agricultural Adjustment and Income.
No. 3 Public Finance and Full Employment.
No. 4 Prices, Wages, and Employment.
No. 5 Private Capital Requirements.
No. 6 Housing, Social Security, and Public Works.
No. 7 The United States in World Trade and Finance.
No. 8 Federal Reserve Policy.

The Federal Reserve System—Its Purposes and Functions. May 1939. 128 pages.
Seasonal Adjustment Factors for New Federal Reserve Index of Industrial Production — December 1941.
Provisions of State Laws Relating to Bank Reserves as of December 31, 1944.

SECURITIES AND EXCHANGE COMMISSION

THE Securities and Exchange Commission, organized in July, 1934, is charged by law with administering seven separate acts, the Securities Act of 1933, Securities Exchange Act of 1934, Public Utility Holding Company Act of 1935, Trust Indenture Act of 1939, Investment Company Act of 1940, Investment Advisors Act of 1940, and Chapter X, National Bankruptcy Act. The Commission is composed of five members, of whom not more than three may be of the same political party. Headquarters are located in Philadelphia, Pa., and ten regional offices are located in other cities.

Although a vast amount of information rests in the files of the Commission and while its publications have reached considerable proportions during the thirteen years of its existence, only a minor portion of the whole is useful for chemical market research activity. This is due to the fact that the collected data are primariy for financial analysis and interpretation. However, many facts of cardinal importance in market research may be obtained from the Commission's publications and files and the nature of this material is outlined below.

Annual Reports, 1935-1945. The eleventh annual report for the fiscal year ending June 30, 1945 is the latest available. It is suggested, however, that the tenth annual report, 1944, which is subtitled "A Ten Year Survey, 1934-1944," be consulted for a complete description of the work of the Commission. Also, on pp. 213-215 of the tenth report will be found a complete list of publications issued during the 10-year period. The publications list is followed by a detailed description of the manner in which registered information is made available to the public, with supporting statistics of the extensive use made of the Commission's files, both at the public reference room in Philadelphia and at the regional offices.

Corporation Annual Reports. Every corporation whose securities are listed on any national securities exchange must file an annual report with the Commission. In addition to the customary balance sheet and income statement, there is given collateral information on such items as subsidiaries, depreciation schedules, etc., in somewhat more detail than is available in the commercial investment manuals and services. The complete subject matter of the report can be learned by examination of a copy of form 10K which is available from the Commission on request.

Registration Statements. All corporations, except those specifically exempted, must file with the Commission registration statements for new security issues. These statements, with amendments, constitute a full disclosure of all facts which, in the opinion of the Commission, will permit investors to make an analysis of the securities to be offered. Among the topics covered are: history and business, property, debt and capitalization, results of operations, application of proceeds, underwriters, terms of offering, legal opinions, management, description of securities offered, opinions of accountants, financial statements, experience of the principal executive officers, management and supervisory contracts, litigation, and miscellaneous information. Under the section on history and business one may find information on production, distribution and sales, operations of subsidiaries, recent additions to plant and property, and labor relations. The application of proceeds section may include statements concerning patents to be acquired or developed, intentions to expand capacities, and to develop new product lines. The prospectus issued by and obtainable from the underwriters may in some cases serve as an acceptable substitute for photocopies of the registration statement itself.

Registration Record, Securities Act of 1933 (Trust Indenture Act of 1939.) These daily bulletins list by name all corporations that have filed registration statements for new security issues. By following these listings, the market research analyst is immediately informed of new sources of information as they become available in the form of registration statements.

Statistical Bulletin. This publication was inaugurated in July, 1942, and is issued monthly. Its primary purpose is to make available the routine statistical data on the capital markets and the securities exchanges. Table I under the securities exchange section gives for 27 industry groups indexes of the weekly closing prices of common stocks on the New York Stock Exchange. Among the 27 industries, chemicals, drugs and cosmetics, and oil producing and refining are separately listed. Each index represents the current market value of shares outstanding as a per cent of the average market value of these shares during January, 1939.

Survey of American Listed Corporations. Statistics of American Listed Corporations. From time to time, the Commission publishes statistical compilations of the financial data contained in the corporation annual reports in its files. This information is very extensive and will be found in numerous parts under the two titles indicated above. The sections of principal interest for market research are *Data on Profits and Operations* and *Balance Sheet Data,* which contain company by company comparisons. In addition to the comprehesive report for 1936-1942 on

profits and operations, 1942-1943 has recently become available. The series for 1942-1943 has a chemicals section containing data for 41 companies in 1943 and 40 companies in 1942. Other industry sections of interest are drugs and medicines, fertilizers, oil refining, paints and varnishes, paper and allied products, toilet preparations and soap, vegetable oil producers, tires and other rubber products, and rayon yarn.

INFORMATION BY SPECIAL ARRANGEMENT

The files of the Commission are available to the public under such regulations and reasonable limitations as the Commission has from time to time prescribed. Consultation with the staff of the Public Reference Section, Philadelphia, or at any regional office, is often advisable if file material is desired for personal inspection. A very considerable amount of the registration statement and corporation report material is open for inspection at the ten regional offices, particularly in New York and Chicago. The Commission will supply photocopies of any document, or part thereof, at 10 cents per page for the first 100 pages in any single order and 7 cents per page for each page over 100 pages.

ARTICLES TO COME

THE following articles are scheduled to appear in subsequent issues as part of the series on Information Sources for Chemical Market Research. These articles will complete the series. The first of its kind ever to appear in the chemical literature, this series has drawn unprecedented comment from all quarters of the chemical process industries, and we are glad to report that arrangements are being made to publish the complete set of articles in booklet form in 1947.—Editor.

"Canadian Statistics," by W. H. Losee and H. McLeod, Dominion Bureau of Statistics.

"Trade Journals and Trade Directories," by Frank Waldo, Pittsburgh Plate Glass Co.

"Trade Associations," by C. J. Judkins, chief, Trade Associations Unit, U. S. Department of Commerce.

"Looking at Markets from the Inside Through Sales Analysis," by L. D. Reed and H. O. Ladd, E. I. du Pont de Nemours & Co.

"Analysis and Interpretation of Market Research Data," by Earnest H. Jurkat, Director of research, Wroe Alderson, Simons and Sessions.

"Preparation and Presentation of Market Research Reports," by Earnest H. Jurkat.

"Library Classification System for Market Research Information," by Gretchen D. Little, Atlas Powder Co., and A. Jeanette Thoroughgood, Wilmington Institute Free Library.

SELECTED CHECK LIST OF DOCUMENTS

Inquiries for statistical information should be addressed to the Public Reference Section, Securities and Exchange Commission, 18th and Locust Streets, Philadelphia 3, Pa. (A, annual; Q, quarterly; M, monthly; D, daily.)

Annual Reports. A. 1935 to 1942, inclusive, and 1944, Superintendent of Documents, Washington, D. C. 1943 and 1945 from the Commission, free.
Corporation Reports. File and photocopies.
Registration Statements. File and photocopies.
Registration Record — Securities Act of 1933 (Trust Indenture Act of 1939) D. Free.
Statistical Bulletin. M. Free.
Decisions and Reports of the Commission. Superintendent of Documents, Washington, D. C. Price list furnished on request.
Survey of American Listed Corporations: (Photocopies, or certain individual sections free, if in print. Write for check list.)
Data on Profits and Operations, parts I, II, III, IV, covers 1120 corporations, 1936-42.
Data on Profits and Operations, parts I, II, III, IV, V, covers 1530 corporations, 1942-43.
Balance Sheet Data, parts I, II, III.
Working Capital of U. S. Corporations. Q. Free.
Volume and Composition of Individual's Savings. Q. Free.
Plant and Equipment Expenditures of U. S. Business. Q. Free.
Cost of Flotation of Equity Securities by Small Companies. Statistical Series Release No. 744. Free.

THE Treasury Department, together with State, War, and Navy, is one of the oldest of the government executive departments. For the purposes of this article its divisions and bureaus can be classified under four headings: Administrative, Finance and Banking, Tax Administration and Enforcement, and Procurement.

The general administrative work of the department is centered in the Office of the Secretary with legal matters handled in the Office of General Counsel. Finance and Banking includes the Bureau of Accounts, Comptroller of the Currency, Bureau of Engraving and Printing, Foreign Funds Control, Bureau of the Mint, Bureau of the Public Debt, Office of the Treasurer, War Finance Division, Division of Tax Research, and Division of Monetary Research. Tax Administration and Enforcement includes the Bureau of Customs, Coast Guard, Bureau of Internal Revenue, and Bureau of Narcotics. The Procurement Division is responsible for determining policies and methods, and performing, in Washington, D. C., and in the field, the procurement, warehousing, and distribution of property for all Federal agencies except the War and Navy departments and the United States Marine Corps.

The statistical material published by the various Treasury divisions listed above under Finance and Banking is primarily useful in general economic analysis and falls outside the customary bounds of market research.

BUREAU OF INTERNAL REVENUE

The Bureau of Internal Revenue has general supervision over the determination, assessment, and collection of all internal revenue taxes. The statistical material emanating from the department through the Income Tax Unit and the Alcohol Tax Unit may, therefore, be regarded as a by-product of taxation, but it is nevertheless very useful to the market research analyst. The compilation of income statistics and the information disclosed through collection of taxes by stamp on certain commodities are reviewed below. The Alcohol Tax Unit's statistics on alcohol, because they are of cardinal importance in chemical market research, are treated later in a special section.

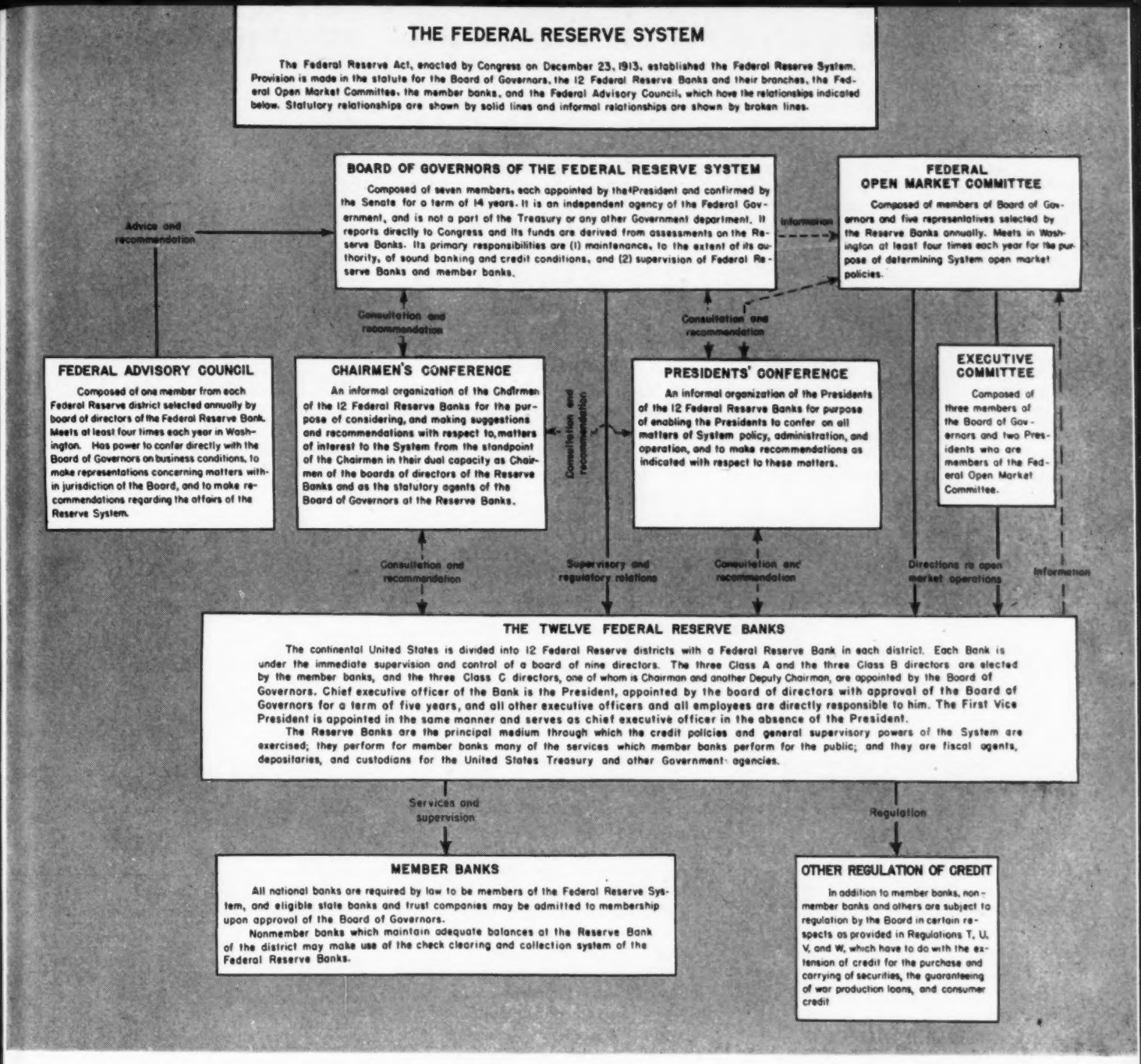
Statistics of Income. The Bureau of Internal Revenue compiles statistics from corporation tax returns showing certain significant data by industry groups. These are published annually in *Statistics of Income,* Part 2, the latest complete annual being for the year 1941. The preliminary report for 1942, showing major industrial groupings, is also available. Chemicals and allied products is shown as a group total, there having been 6,872 tax returns for the entire industry in 1941. Subgroups listed are: paints, varnishes, and colors; soap and glycerin; drugs, toilet preparations, etc.; rayon (raw materials) and allied products; fertilizers; oils, animal and vegetable, except lubricants and cooking oils; plastic materials; industrial chemicals; other chemical products; and chemical and allied products not allocable.

For each sub-group statistics are compiled on the total number of returns, and, both for "returns with net income" and for "returns with no net income," the number of returns, the total receipts, and the dividends paid in cash and assets other than own stock. For the "returns with net income" there is also shown the net income, total tax, normal tax, surtax, and declared value excess profits tax, and for the "without net income" groups the amount of deficit. No other statistics are published for industry sub-groups.

Following the pattern of the corporation tax return, each industry group is listed by detailed receipts, detailed deductions, profits, taxes paid, and dividends paid. Tables on balance sheet items by industry groups also appear. In addition, certain significant balance sheet and income account items are broken down by total assets classes ranging from companies with $1,000 or less to those with over $100 millions.

These income statistics are of interest primarily from the standpoint of trends in profitability on an industry-wide basis and in growth factors based on balance sheet items. For long term comparisons, it should be noted that "petroleum and other mineral products" was included in "chemicals and allied products" prior to 1936.

Commodity Revenue Tax Data. The annual reports of the Commissioner of Internal Revenue are an excellent source of information for the production or withdrawal from stocks of many important articles of commerce, due to the fact that not only the amounts of taxes paid but also the quantities involved are either tabulated or can be calculated from the


THE FEDERAL RESERVE SYSTEM
The Federal Reserve Act, enacted by Congress on December 23, 1913, established the Federal Reserve System. Provision is made in the statute for the Board of Governors, the 12 Federal Reserve Banks and their branches, the Federal Open Market Committee, the member banks, and the Federal Advisory Council, which have the relationships indicated below. Statutory relationships are shown by solid lines and informal relationships are shown by broken lines.
BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM
Composed of seven members, each appointed by the President and confirmed by the Senate for a term of 14 years. It is an independent agency of the Federal Government, and is not a part of the Treasury or any other Government department. It reports directly to Congress and its funds are derived from assessments on the Reserve Banks. Its primary responsibilities are (1) maintenance, to the extent of its authority, of sound banking and credit conditions, and (2) supervision of Federal Reserve Banks and member banks.
FEDERAL OPEN MARKET COMMITTEE
Composed of members of Board of Governors and five representatives selected by the Reserve Banks annually. Meets in Washington at least four times each year for the purpose of determining System open market policies.
Advice and recommendation
Information
Consultation and recommendation
Consultation and recommendation
FEDERAL ADVISORY COUNCIL
Composed of one member from each Federal Reserve district selected annually by board of directors of the Federal Reserve Bank. Meets at least four times each year in Washington. Has power to confer directly with the Board of Governors on business conditions, to make representations concerning matters within jurisdiction of the Board, and to make recommendations regarding the affairs of the Reserve System.
CHAIRMEN'S CONFERENCE
An informal organization of the Chairmen of the 12 Federal Reserve Banks for the purpose of considering, and making suggestions and recommendations with respect to, matters of interest to the System from the standpoint of the Chairmen in their dual capacity as Chairmen of the boards of directors of the Reserve Banks and as the statutory agents of the Board of Governors at the Reserve Banks.
Consultation and recommendation
PRESIDENTS' CONFERENCE
An informal organization of the Presidents of the 12 Federal Reserve Banks for purpose of enabling the Presidents to confer on all matters of System policy, administration, and operation, and to make recommendations as indicated with respect to these matters.
EXECUTIVE COMMITTEE
Composed of three members of the Board of Governors and two Presidents who are members of the Federal Open Market Committee.
Consultation and recommendation
Supervisory and regulatory relations
Consultation and recommendation
Directions re open market operations
Information
THE TWELVE FEDERAL RESERVE BANKS
The continental United States is divided into 12 Federal Reserve districts with a Federal Reserve Bank in each district. Each Bank is under the immediate supervision and control of a board of nine directors. The three Class A and the three Class B directors are elected by the member banks, and the three Class C directors, one of whom is Chairman and another Deputy Chairman, are appointed by the Board of Governors. Chief executive officer of the Bank is the President, appointed by the board of directors with approval of the Board of Governors for a term of five years, and all other executive officers and all employees are directly responsible to him. The First Vice President is appointed in the same manner and serves as chief executive officer in the absence of the President.
The Reserve Banks are the principal medium through which the credit policies and general supervisory powers of the System are exercised; they perform for member banks many of the services which member banks perform for the public; and they are fiscal agents, depositaries, and custodians for the United States Treasury and other Government agencies.
Services and supervision
Regulation
MEMBER BANKS
All national banks are required by law to be members of the Federal Reserve System, and eligible state banks and trust companies may be admitted to membership upon approval of the Board of Governors.
Nonmember banks which maintain adequate balances at the Reserve Bank of the district may make use of the check clearing and collection system of the Federal Reserve Banks.
OTHER REGULATION OF CREDIT
In addition to member banks, nonmember banks and others are subject to regulation by the Board in certain respects as provided in Regulations T, U, V, and W, which have to do with the extension of credit for the purchase and carrying of securities, the guaranteeing of war production loans, and consumer credit

rate of tax with a reasonable degree of accuracy. Examination of these annuals alone will indicate the completeness of the material, but the following products can be listed as the principal ones of interest: manufactured tobacco, cigars, cigarettes, oleomargarine, coconut oil, playing cards, ethyl alcohol, spirits, malt liquors and cereal beverages, and wines. Tabulations of materials used in manufacture are given in the case of some products, e.g., oleomargarine, undenatured ethyl alcohol, and malt liquors and cereal beverages. A considerable amount of this information is available through monthly releases of the Bureau and annual summaries are also processed for distribution in advance of the annual report. (For listing, see Selected List of Documents.) Monthly production, withdrawals, and ingredient schedules for oleomargarine appear in the *Internal Revenue Bulletin.*

ALCOHOL TAX UNIT

The Alcohol Tax Unit of the Bureau of Internal Revenue compiles very comprehensive statistics on ethyl alcohol, and their use is invaluable in chemical market research. Under the titles *Statistics on Alcohol,* and *Statistics on the Uses of Specially Denatured Alcohol,* these data have been released on a governmental fiscal year basis. *Comparative Statistics on Domestic Alcohol* is a monthly release on production, withdrawals, and stock of ethyl and denatured alcohol. The title *Statistics on Alcohol* was first used for the report of the fiscal year ending June 30, 1935. The report for fiscal 1934, the first published by the Alcohol Tax Unit, was titled *Statistics on Industrial and Beverage Alcohol.* Prior to 1934, comparable statistics can be obtained by referring to the last issue of *Statistics Concerning Intoxicating Liquors* (December, 1933), and to earlier annuals, publications of the Bureau of Industrial Alcohol. Because of security reasons, *Statistics on Alcohol* was discontinued for the fiscal years 1942 to 1945 inclusive. The Alcohol Tax Unit has recently released the statistics for these years and the reports are currently available from that unit. *Statistics on the Uses of Specially Denatured Alcohol* was first issued covering the fiscal year 1936. Reports were also published for fiscal 1937 and for fiscal 1940, and releases for 1941-45 have recently been made available by the Alcohol Tax Unit.

The annual bulletin *Statistics on Alcohol* presents data on production, consumption, stocks, and raw materials consumed in the production of ethyl alcohol, with details by months and by states. Figures on withdrawals of specially denatured alcohol, by formulas, make it possible to

compute quantities of various denaturants employed. As some of the formulas are restricted to one or two uses, their volumes of consumption may be a measure of the end use of another chemical product. Information as to the composition and authorized uses of these formulas will be found in the 1931 and 1938 editions of the *Appendix to Regulations No. 3, Formulae for Completely and Specially Denatured Alcohol, Treasury Department,* as amended by Treasury Decision No. 4967. In the annual bulletin withdrawals of the leading formulas of specially denatured alcohol are also given by months.

Comparative Statistics on Domestic Alcohol, a monthly release of the Alcohol Tax Unit, contains statistics on ethyl and denatured alcohol produced, withdrawn, and stocks. The publication was suspended for the duration of the war with the November, 1941, issue. These data are currently appearing in the Survey of *Current Business* and the incomplete monthly data for December, 1941, to February, 1945, will be published in that document in a forthcoming issue.

Probably the most satisfactory statistical compilation of any government agency, from the standpoint of the chemical market research analyst, is the release of the Alcohol Tax Unit on *Uses of Specially Denatured Alcohol.* The statistics are classified according to (a) basic functions, and (b) products manufactured with specially denatured alcohol. Thus, under functions, are uses as a solvent, as a raw material in the production of other chemicals, as a fluid, and as a fuel. The secondary classification is by product end use and the breakdown is very complete. Supplementing the industrial uses are statistics on the amount used for laboratory and experimental purposes and the amount of specially denatured rum used. This series is complete for the fiscal years 1936, 1937, and 1940 to 1945 inclusive.

BUREAU OF NARCOTICS

The Bureau of Narcotics, under the Commissioner, supervises the administration of those sections of the Internal Revenue Code relative to narcotic drugs and marihuana, the Opium Poppy Control Act of 1942, and related statutes, including the administration of the permissive features of the Narcotic Drugs Import and Export Act. The annual report of the Commissioner is published under the title *Traffic in Opium and Other Dangerous Drugs.* Examination of these annuals will reveal both the problems involved in controlling the illicit traffic in these products and the standards governing the legitimate commercial trade.

A considerable amount of tabular material is presented on the annual volumes in the raw materials and finished products. The following subjects are tabulated: allotments of crude opium granted to importers; imports of crude opium; imports of coca leaves by country of production; and imports of cannabis seed (hemp seed). Also a statement of crude opium and coca leaves imported, used, and held as stocks by importing manufacturers, with the following end uses specified: (1) for extraction of alkaloids and salts; (2) for manufacturing medicinal opium; (3) for manufacturing tinctures; (4) for extracts and other preparations; (5) for manufacturing narcotic products; and (6) other uses. Annual statistics are also compiled on the principal drugs produced, produced for sale, sold, and held as finished stocks. Exports of taxable narcotic drugs by type and by country of destination are tabulated.

CUSTOMS BUREAU

The *Tariff Act of 1930 on Imports Into the United States* lists tariff rates and administrative regulations. Weekly lists of changes in rates caused by court decisions and departmental interpretations of regulations concerning classification or value will be found in *Treasury Decisions Under Customs, Certain Internal Revenue, Narcotic, and Other Laws, including Decisions of Customs Court and Court of Customs and Patent Appeals.* The Bureau of Customs is prepared to furnish information on and interpretations of the Tariff Act and customs regulations. For example, they will advise on the tariff rates applicable to articles not specifically named in the Act.

PROCUREMENT DIVISION

Groups for Procurement. Section III of the Federal Standard Stock Catalog consists of commodity classifications set up for procurement by federal non-military agencies. Through examination of a particular product section, it is possible to secure information that would take much time and effort to assemble from other original or secondary sources.

For instance, the release on Shellac (group TT—N, Shellac—1, December, 1938), is a seventeen page mimeographed document. The federal specification codes (see section below) are given as well as a description of the plan for Federal procurement. There follows a section on sources of supply with tabular information on world production, domestic bleaching, ports of importation, imports by countries, and domestic consumption. Section III gives a detailed description of manufacturing or producing methods, including origin and cultivation of lac, manufacture of shellac, shellac varnish, chemical and physical properties, and trends in production. Marketing, competition, and prices are covered in Section IV. Prices are tabulated for TN Orange Shellac annually from 1921 to 1937 and monthly from 1928 to 1937. Section V describes the uses of the product and Section VI the substitutes. Section VII gives data on commercial practices, specifications, and standards of both governmental and non-governmental agencies. The concluding section VIII is a bibliography of the commodity.

Federal Specifications. Under the direction of the Director of Procurement, Federal Specifications are prepared for supplies used by the several executive departments and independent establishments. These are published as Section IV of the Federal Standard Stock Catalog. A complete list, arranged alphabetically by titles, and by product groups, may be found in *Part I, Federal Specifications Index,* published by the Procurement Division. Each individual specification pamphlet bears the title thus: *Federal Specification for Varnish; Shellac, TT-V-91a, February 26, 1940, Superseding Federal Specification TT-V-91, May 26, 1931.* Wherever access to the cumulative Federal Standard Stock Catalog is impossible, the individual product specifications may be obtained by consulting *Federal Specifications Federal Standard Stock Catalog,* November, 1945 (or later issue), for specification code, product, date, and price.

SELECTED LIST OF DOCUMENTS

(Documents of a purely fiscal or monetary nature are not included in this list. See *Publications of the Treasury Department,* May 15, 1944, for complete listing.) Available from the Superintendent of Documents if price is shown, otherwise, free of charge. (A—Annual, M—Monthly, S—Semimonthly.)

Secretary of Treasury Annual Report on the State of the Finances. A. $1.25.
Commissioner of Internal Revenue, Annual Report. $0.25.
Director of the Mint, Annual Report. $0.50.
Traffic in Opium and Other Dangerous Drugs. (Beginning in 1932 this pamphlet is also the Annual Report of the Commissioner of Narcotics.) $0.15.
Tariff Act of 1930 on Imports Into the United States. n. d. Free.

Releases of the Bureau of Internal Revenue

Comparative Data of Tax Paid Products. M.
Statement of Quantities of Various Manufactured Products on Which Tax was Paid by Stamp. A.
Statement of Internal Revenue Receipts by Collection Districts and States from Liquor Taxes. A.
Comparative Statement of Internal Revenue Receipts by Collection Districts and States from the Tax on Tobacco Manufactures. A.
Statistics of Income, Part 2, Corporations. $0.45.
Internal Revenue Bulletin. S. $0.10 single copy (See Cumulative below.)
Cumulative Bulletin of Internal Revenue Rulings and Decisions. A. $2.50 per annual subscription.
Statistics on Distilled Spirits. M.
Statistics on Rectified Spirits. M.
Statistics on Fermented Malt Liquors. M.
Statistics on Wine. M.
Gauging Manual, 1941. $1.25.
Statistics on Alcohol. A.
Comparative Statistics on Domestic Alcohol. M.
Statistics on the Uses of Specially Denatured Alcohol. A.

Releases of the Procurement Division

Federal Standard Stock Catalog, 1939.
Section I General Index of Federal Property
Section II Classes for Storage and Issue
Section III Groups for Procurement
Section IV Federal Specifications
Section V Addenda
Section VI Special Departmental Catalogs
Section IV, Part I, Federal Specifications Index, revised to February 1, 1946. $0.30.
Federal Specifications, Federal Standard Stock Catalog, price list of items in stock, November, 1945. Superintendent of Documents. Free.

Release of the Division of Research and Statistics

Publications of the Treasury Department, May 15, 1944.

Other General Documents

Treasury Decisions Under Customs, Certain Internal Revenue, Narcotic, and Other Laws, Including Decisions of Customs Court and Court of Customs and Patent Appeals. W. Single copy $0.10. $3.00 per year.
Index to Treasury Decisions Under Customs and Other Laws. A. $0.10 copy, included in price of Treasury decisions for subscribers.

HEADLINERS in the NEWS

ABIJAH U. FOX, elected chairman of the board, Mathieson Alkali Works Inc. He returned from Germany recently where he was with the U. S. Military Government.

SAMUEL LENHER, named director of manufacture, dyestuffs division, E. I. du Pont de Nemours & Co. Inc. He assumed the position, a new one in the company, on Oct. 1.

DAN M. RUGG, advanced to the post of general manager of the Chemical Division, Koppers Co. Inc. Previously Mr. Rugg was manager of the former Butadiene Division.

REGINALD ROCKWELL, appointed general manager of the Paper Makers Chemical Dept., Hercules Powder Co. Joining Hercules in 1922 he succeeds the late Ralph B. McKinney.

WILLARD D. PETERSON, named associate director, Organic Research Division, J. T. Baker Chemical Co. He was formerly a research administrator with General Aniline.

ERNEST V. HAINES, named head of the newly-created patent department, International Minerals and Chemicals Corp. He has been with the U. S. Patent Office.

WILLIAM D. TICKNER Jr., appointed manager, Export Division, Commercial Solvents Corp. Recently returned from Europe he was assistant to the company's sales vice-president.

KENNETH H. BARNARD, named to head the Textile Resin Application laboratory of American Cyanamid Co. Prior to joining Cyanamid he was with the Pacific Mills.

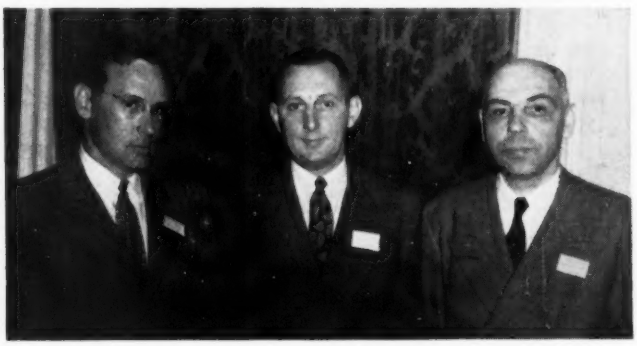
Chemical Engineers Gather 'Neath the Golden Gate

In keeping with the tremendous wartime growth of the chemical process industries on the Pacific Coast, the San Francisco meeting of the A. I. Ch. E. shattered all attendance records for regional meetings of the Institute. Helping to swell the official registration to almost 700 was a liberal scattering of members from the East, Middlewest, and Southwest, some of whom combined a vacation with their trip to the Golden Gate city. The meeting was the first held by the Institute on the West Coast since 1915.

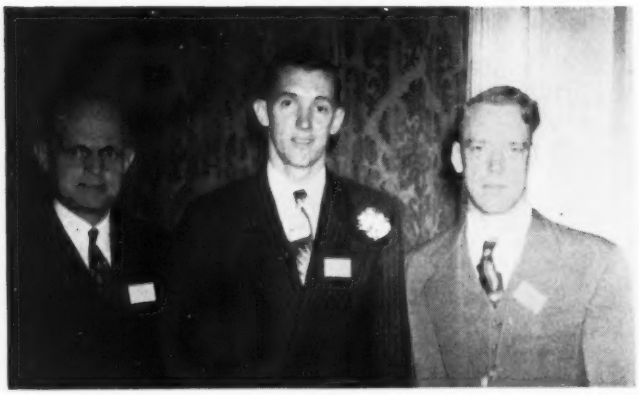
A prominent feature of the program was a symposium of 14 papers on new Western chemical industries. Other papers covered the manufacture of chemicals from petroleum, corrosion studies, and research and performance reports on various subjects related to chemical engineering unit operations.

A. G. Stern, Westvaco Chlorine Products Corp., chairman of the San Francisco section, A. I. Ch. E.; C. R. Nelson, Shell Development Co., meeting chairman, and A. V. Caselli, in charge of entertainment.

Back row: Geo. W. Carter, Coal Logs, Inc.; H. G. Staaterman, Shell; R. W. Mumford, American Potash. Front: E. K. Metzner; John R. Callaham, Chem. Engineering; J. C. Schumacher, Western Electrochemical.

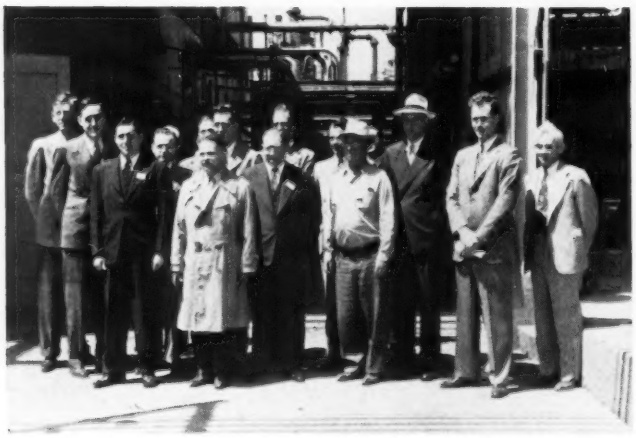


H. A. Cheney, A. W. Fairbairn, and A. J. Cherniavsky, Shell Development Co. discussed "The Manufacture of Allyl Alcohol by Hydrolysis of Allyl Chloride." James G. Vail presided.



H. C. Schutt, Stone and Webster Engineering Corp.; R. G. Fairfield, Union Oil Co. of California; and C. F. Oldershaw, Dow Chemical Co., dealt with propane cracking, desulfurization, and hydrogen chloride purification.

R. B. Olney, Shell Development Co.; John Anderson, Shell; and C. M. Beamer, Standard Oil (N. J.) Louisiana discussed equipment design, production of cumene, and synthetic ethanol, respectively.



One of the groups visiting the Dow Chemical Co.'s plant at Pittsburg, Cal. pauses for the C. I. photographer. The meeting program included trips to six plants in the San Francisco Bay area.

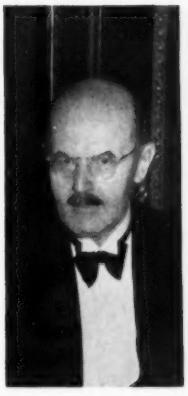
Back row: I. E. Levine, Cal. Research Co.; E. Ericsson, Puget Sound Pulp; A. C. Byrns, Permante Metals; H. H. Smith, Dow; Front: R. W. Moulton; W. Hirschkind, Dow; P. M. Huemmer, Union Oil.

ACS Convenes at Chicago

Dual records were established at the 110th ACS convention held at Chicago last month, with the number of papers presented (726) greater than ever before, and attendance of 8900 chemical men second only to the 10,000 record of the 1944 New York meeting.

Pictured above (left) are: Fred C. Koch, meeting chairman; Carl S. Marvel, past president ACS; and Roger Adams, recipient of the coveted Priestly Medal. At right (above) J. D. Ferry and Icie Macy Hoobler, winners of the Eli Lilly award and the Garvan Medal, respectively.

At left, A. Watson Chapman presents the ACS Pure Chemistry award to C. C. Price III, while Bradley Dewey looks on.



Among those attending the dinner in honor of Dr. Claude S. Hudson were (left to right): H. O. L. Fischer, University of Toronto; S. M. Cantor, Corn Products Refining; J. K. Dale, Commercial Solvents; W. N. Haworth, University of Birmingham; Dr. Hudson; F. J. Bates, National Bureau of Standards, and R. M. Hann, National Institute of Health.

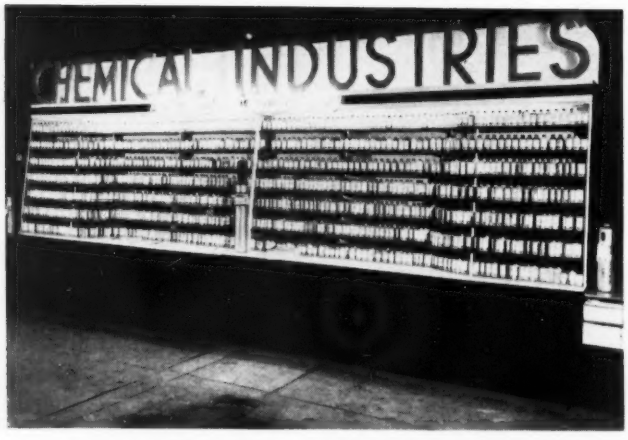
In the conventional order: C. F. Irwin, F. B. Stilmar, and W. S. Struve, all of E. I. du Pont de Nemours & Co., Inc., discuss various facets of the papers presented at the fluorine symposium.

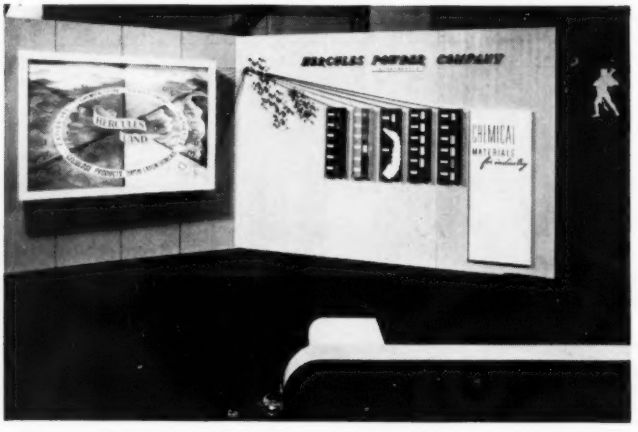
Howard Cramer, Sharples Chemicals, Inc., and A. Byam, E. I. du Pont de Nemours & Co., Inc., at the Division of Rubber Chemistry sessions which attracted much attention this year.

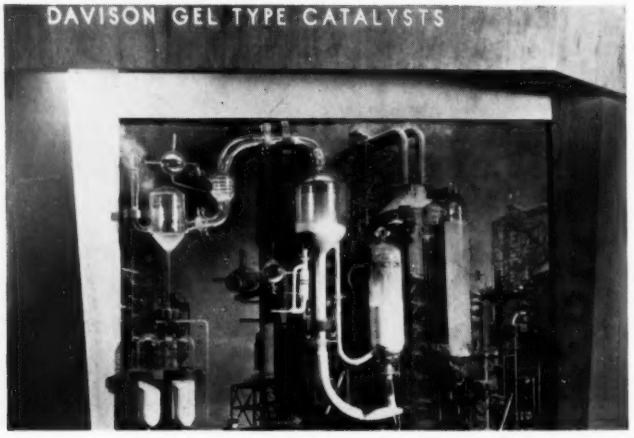
Record Chemical Exposition Attendance

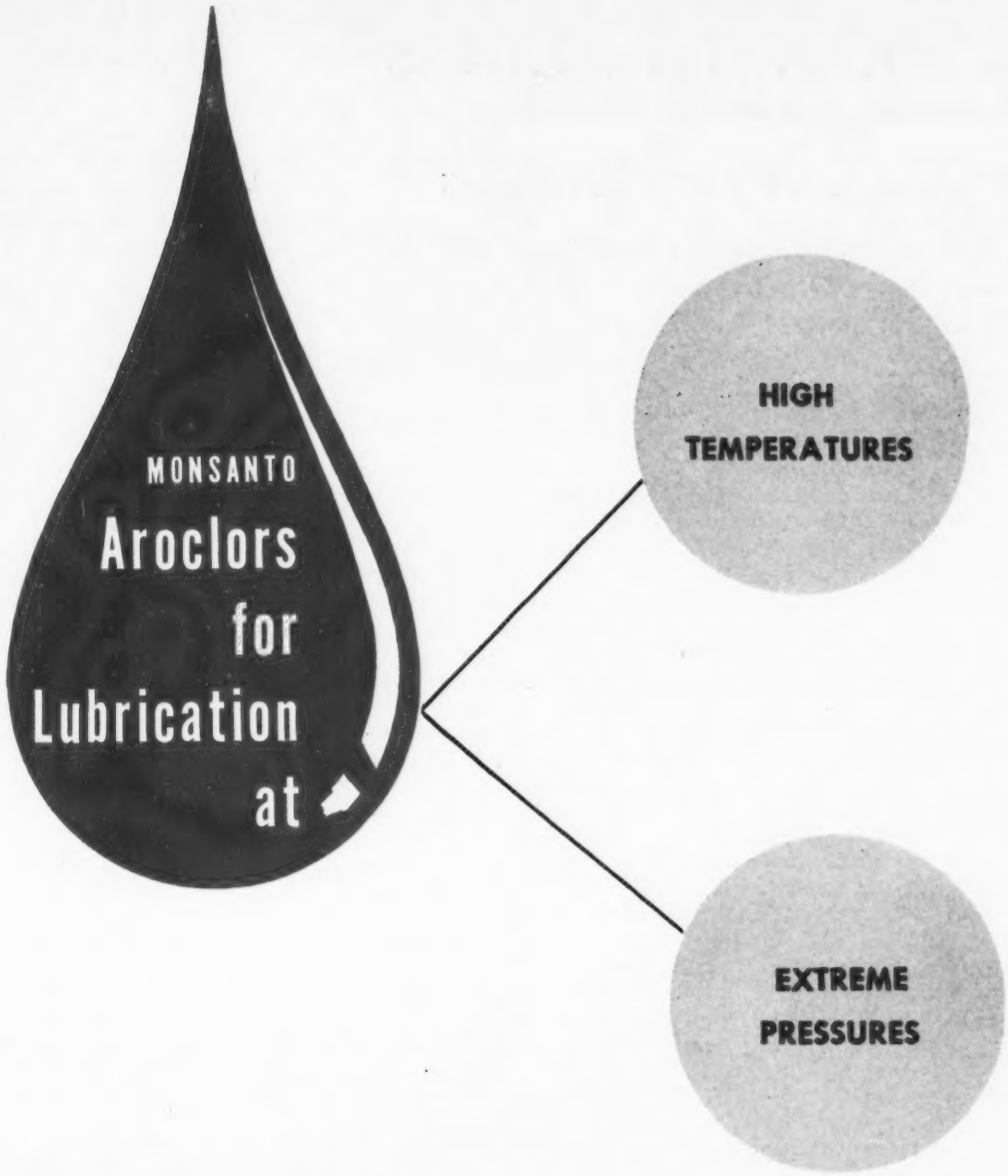
More than 46,000 guests viewed the exhibits at the Fourth National Chemical Exposition held in Chicago last month to establish an all-time high in attendance records. Although a good deal of the increased interest in the Exposition can be explained by the fact that the ACS convention was held concurrently, one feature which was evident to exhibitors was the specific character of the inquiries received. Even six months ago many exhibition inquiries were general and indecisive; now postwar production plans appear to have crystallized and chemical men seek specific, detailed information. Chemical Industries' booth (below) displayed more than 1000 new chemicals and chemical specialties introduced by its advertisers in the past two years.

Apart from industrial exhibits, Chemical Trail Blazers, inaugurated two years ago, portrayed many recent chemical advances by means of illuminated and animated panels.

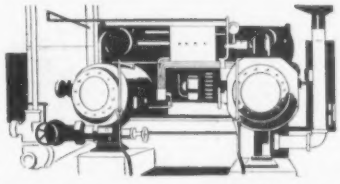




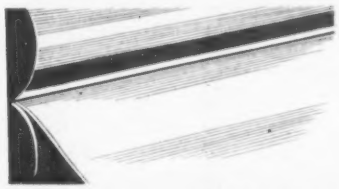




Among the many applications of Monsanto Aroclors, their use in specialized lubrication is of particular interest.



Their heat-resisting, non-inflammable characteristics make them especially suited for use as a hydraulic fluid under conditions of high temperatures, such as those encountered in governor systems in central stations.



For extreme pressure lubrication requirements present in the rolling of stainless steel and chromium iron, the Aroclors prevent surface seizure and consequent pitting of rolls and scoring of rolled surfaces.

General Characteristics of the Aroclors ... As a series, the Aroclors range in form and appearance from mobile oily liquids to fine white crystals and hard transparent resins. They are heavier than water — possess great adhesiveness, especially on smooth surfaces — have remarkable penetrating power —are water repellent and flame resistant. Their ability to withstand extreme pressure is unusual.

Send for Bulletin No. P-115. It contains detailed information that may suggest new and profitable uses to you ... Contact the nearest Monsanto Office, or write: MONSANTO CHEMICAL COMPANY, Phosphate Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Cincinnati, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

MONSANTO CHEMICALS

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BETWEEN THE LINES

Broader Horizons for Fertilizers

As in many other fields, the war accelerated acceptance of fertilizers in places where they had not been used previously. A large part of these expanded markets will remain as permanent outlets for lime, nitrogen, sulfuric acid, phosphoric acid, potash, and other fertilizer chemicals.

AUGMENTED use of lime and commercial fertilizer, even above the high war-time level, is seen as a postwar development in a study completed last month by the Bureau of Agricultural Economics of the Department of Agriculture.*

As a result of war pressure, many farmers learned for the first time the value of lime and fertilizer, the study points out. They are not likely to reduce their purchases hereafter, except under severe depression conditions.

It is now recognized that increased use of fertilizer and lime was an important factor in the phenomenal achievement of this country's farms in meeting domestic and foreign food demands on an unprecedented scale.

A major difference in the food situation of the United States in the recent war compared with the First World War lay in the comparative availability and use of fertilizers. Because, prior to World War I, potash fertilizers had been imported from Germany, there was a serious shortage of this plant nutrient from 1916 on. Food production was actually limited by a fertilizer shortage.

During and immediately prior to World War II, use of both lime and commercial fertilizers expanded. While figures on liming are not available before 1929, that year they were about 60 per cent of the amounts used in the 1935-1939 period. In the later years of this war, use of liming materials was about three times the prewar rate despite shortages of labor and trucks for crushing and hauling.

Application Knowledge Growing

Research developments incident to the use of fertilizers throw further light on the general outlook. On many soils in the humid regions it is necessary to apply lime in order to get the full use of commercial fertilizer, especially phosphates. Lime and phosphate applications are considered especially necessary for the legumes and grasses advocated in good crop rotation practice. In fact, some of the increase in use of commercial fertilizers is accounted for by the greater use of phosphates in combination with liming materials for hay and pasture improvements in recent years.

While there was a relatively large wartime distribution of fertilizers by public agencies, it is claimed that this accounted for only 10 per cent of the total value of fertilizer used in the period.

For the postwar years, it is predicted by the Department of Agriculture economists that annual use of lime must be increased if all lands in the humid areas of the country needing lime are to receive even an initial application, and if adequate maintenance applications are to be made thereafter. It has been estimated that the tonnage of lime necessary for this would be about 2½ times the 1943 level, even after the initial application.

State committees that have been studying the matter for the Department now report that under favorable price conditions it would pay farmers to use about twice the quantity of plant nutrients, in the form of commercial fertilizers, that was used even during the war year of 1944. However, it is believed some educational work must precede any such expansion.

In addition to educating farmers to the advantages of increased use of fertilizers, Department authorities suggest that government aid might be extended in obtaining lime and fertilizers, among other materials.

Shortage World Wide

Meanwhile, the American industry is still concerned with the immediate world shortage of fertilizers. In spite of increased production, here and abroad, the Department of Agriculture reported recently that the shortage over the world is so severe as to almost baffle solution. There is a world shortage of nitrogen fertilizer materials, for example, of probably 1,000,000 tons.

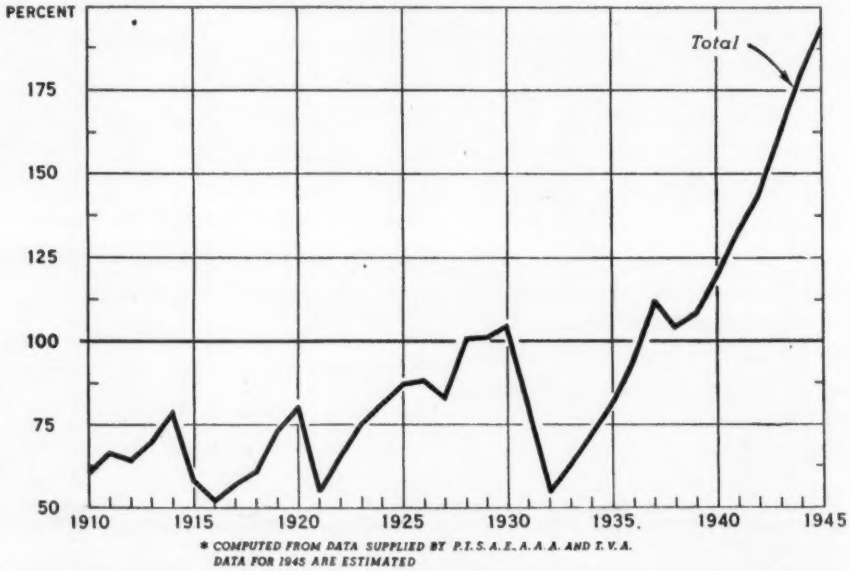
There has been a greatly increased immediate demand for chemical fertilizers, such as ammonium sulphate, on the part of northern farmers, who for the first time during the war discovered the advantages of fertilizing commercial crops.

This suggests the possibility that the South may decline as the primary market for this type of fertilizer. This does not mean that the South is out as a market, obviously, but merely that other sections are making the discovery that Southern farmers made before them: the use of fertilizer increases production and quality of crops.

There is an incidental situation that may have some bearing on the future, also, particularly with respect to ammonium sulphate. The normal pricing system not only favored the individual buyer in

FERTILIZER CONSUMPTION IN TERMS OF NITROGEN, PHOSPHORIC ACID, AND POTASH, CONTINENTAL UNITED STATES, 1910-45 *

INDEX NUMBERS (1935-39=100)

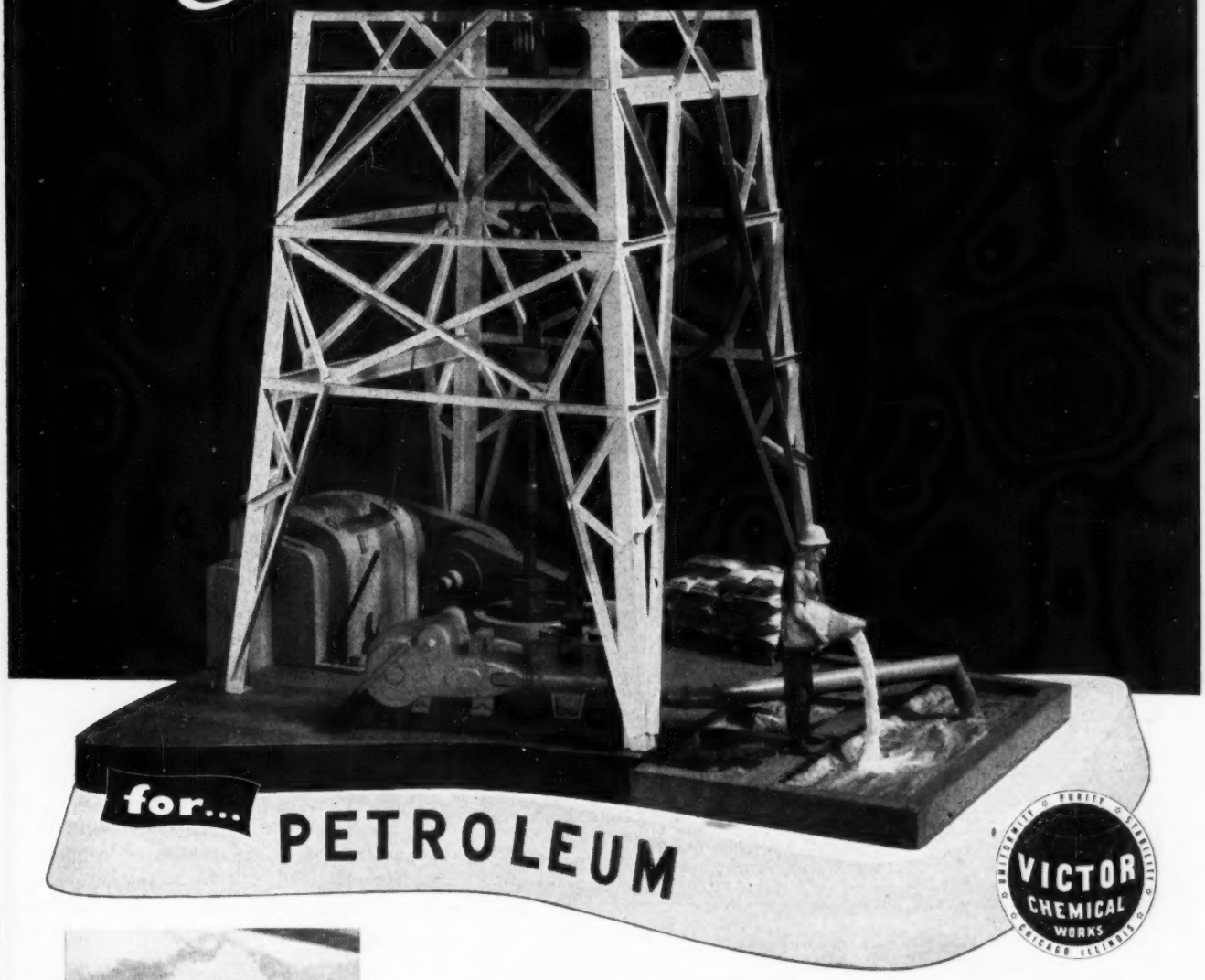


* COMPUTED FROM DATA SUPPLIED BY P.T.S.A.E., A.A.A. AND T.V.A.
DATA FOR 1945 ARE ESTIMATED

Use of nitrogen, phosphoric acid, and potash as fertilizer during World War II reached a level nearly double that of the 1935-39 average. The highest consumption before 1937 occurred in 1930, when the level reached was 5 per cent above the average of the years 1935-39.

* "Changes in Farming in War & Peace" by Dr. Sherman E. Johnson et. al.

VICTOR *Chemicals*



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In the drilling of oil wells special muds are employed to cool and lubricate the drill bit, prevent cave-ins, hold back tremendous gas pressures and other purposes. Good drill mud must be sufficiently fluid to pump easily, yet capable of building thin, impermeable walls. It should be viscous, yet fluid enough to drop out rock cuttings in the mud pits. To control the viscosity of drill mud, chemicals are usually added . . . sodium phosphates as thinners, powdered ferrophosphorus to increase weight. Both chemicals are produced by Victor. Other Victor chemicals used in oil well drilling and petroleum refining include: **Alkyl Phosphates** (oil additives, stabilizers for gasoline), **Ferrophosphorus** (weighting drill mud), **Phosphoric Acid** (refining oil and gasoline), **Sodium Acid Pyrophosphate, Sodium Tripolyphosphate,** and **Tetrasodium Pyrophosphate** (conditioning drill mud), **Tripotassium Phosphate** (purifying gasoline).

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certain locations, but influenced sellers' distribution plans to the extent that they naturally favored buyers in locations near the producing ovens.

About 90 per cent of the total domestic production of ammonium sulphate is concentrated in northern and northeastern steel plants, coke ovens, and utilities gas plants, but about 70 per cent of consumption customarily has been in the South. Fertilizer mixers in that area have come to depend on ammonium sulphate as an indispensable source of a substantial part of the nitrogen content of their fertilizer mixes.

Governmental controls of ammonium sulphate distribution during the war, it is claimed, have maintained distribution substantially along customary lines, despite pricing provisions that reflected trade practices but actually tended to move the pattern in an opposite direction in practical operation. Government allocation was discontinued last year, but through April of this year the influence of these controls on the distribution pattern remained, due to the extended delivery contracts involved.

There has been a recent return by sellers to the old prewar system of distribution, it is reported, favoring customers that are convenient to producing centers as against those in more remote areas. The northern demand resulting from war experience is helping this trend along and has caused some study by government authorities as to its effect on postwar needs.

Probably no inconvenience will result to large manufacturers with plants in both North and South, but hundreds of smaller manufacturers, particularly in the South, might have felt the change if the government had not issued certain equalizing price actions, the long run effect of which is yet to be determined.

Price Increases Granted

A number of price increases have been authorized in recent months or weeks, to reflect various conditions in the industry. These have covered imported Chilean nitrates, superphosphate and mixed fertilizers, ammonium sulphate, and regional sales.

A substantial part of the costs of chemical fertilizers to farmers, however, consists of transportation charges on the raw materials from mine, port, primary production points to factories, intermediate products from factory to factory, etc. Most raw materials travel considerable distances—potash from California and New Mexico, sulphur from Louisiana and Texas, 80 per cent of phosphate from Florida, and quantities of nitrogen from Eastern states.

Before leaving these generalizations on cost, which have a bearing on the future consumption of fertilizers, it might be well to quote what one agency claims:

"Relatively speaking, in terms of prices farmers receive for their produce and prices paid by them for items of production expense, chemical plant foods are in the most favorable relationship for farmers of all their production expense items.

"While net farm income has about trebled since 1939, fertilizer costs to farmers have increased only 21 per cent. No general increase of fertilizer retail prices has occurred in the past three years.

"Consequently, although production of chemical plant foods has increased 80 per cent over a 5-year prewar average, demand still exceeds supply without taking into account the world shortage of such materials."

Domestic production of fertilizer materials is expected to be maintained at the peak war level, or even increased, while the present situation continues.

Beryllium Production Techniques Detailed

Beryllium production processes used by the Deutsche Gold und Silber Scheide Anstalt at Frankfort, Germany, are described in a report issued by the Office of Technical Services, Department of Commerce.

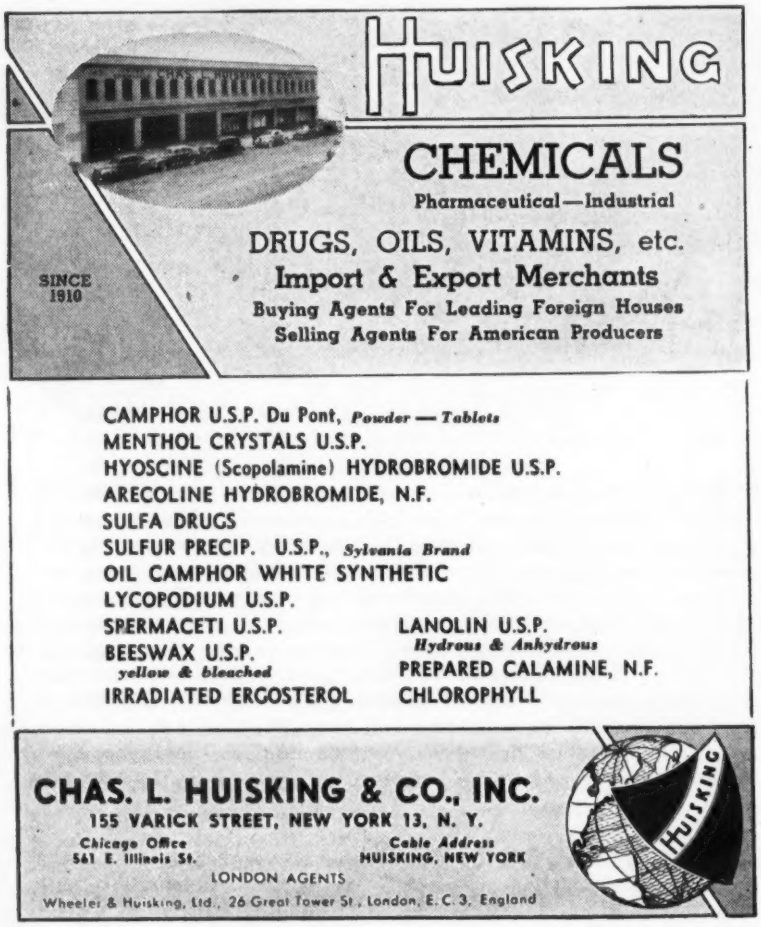
The manufacturing process was divided into two parts: production of pure anhydrous beryllium chloride from the mineral beryl, and electrolytic production of metallic beryllium.

In the first part of the process, beryl ore was ground in a dry ball mill, mixed with lime in a drum, and then fused in a rotary kiln. To separate the silica and lime from the other oxides present, the slag was disintegrated by a water quench and then dried. The dry clinker was treated with sulphur dioxide to form sulphates of the soluble oxides.

Silica and calcium sulphate were removed by filtration. A hot ammonium sulphate solution was then added to the hot filtrate, and the alum in the mixture was crystallized out. Iron salts were removed from the solution by adjusting the acidity and by the addition of hydrogen peroxide and calcium carbonate. A sludge of ferric hydroxide and calcium sulphate was precipitated and removed by filtration.

The resulting solution was pumped into a circular-stirred vessel, and ammonia gas was passed into the solution until all the sulphate was neutralized and beryllium hydroxide was precipitated. The precipitated beryllium hydroxide was filtered, dried, briquetted with organic binder and charcoal, extruded in the form of rods, carbonized, and then chlorinated. Purification of the resulting crude beryllium chloride by distillation followed.

The electrolysis process was carried out in nickel crucibles with external auxiliary heating. The melt consisted of a mixture of equal parts of beryllium chloride and sodium chloride. The metal content of beryllium obtained from the electrolysis process averaged 98-99 per cent.



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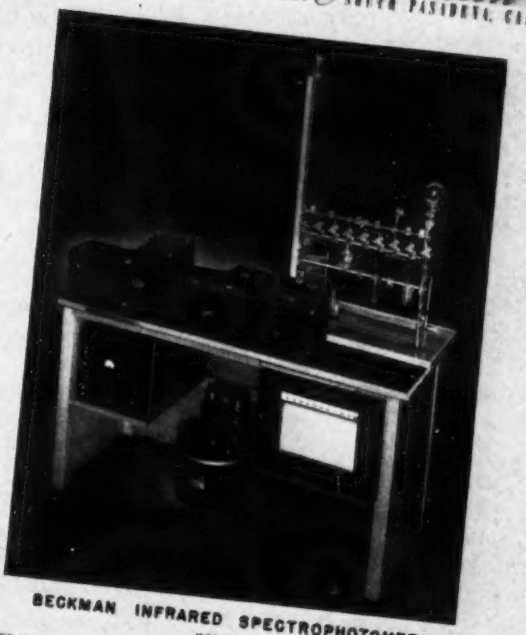
BECKMAN Bulletin 153

...TECHNICAL LABORATORIES SOUTH PASADENA, CALIFORNIA

THE BECKMAN IR2 INFRARED SPECTROPHOTOMETER is making possible new analytical and control methods in many of today's industrial processes. Developed originally to simplify plant control methods in the refining of butadiene and aviation gasolines, Infrared equipment proved so valuable in saving time and stepping up the efficiency of plant processing operations that other industries wanted similar Beckman equipment for simplifying their analytical and control problems.

As a result of this widespread demand—and backed by the invaluable experience gained by Beckman engineers in building more Infrared Spectrophotometers than all other makes combined—the Beckman IR2 Spectrophotometer was developed. This instrument, besides embodying the advancements of the original Beckman Infrared instrument, incorporates other advancements that extend the advantages of infrared analytical and control methods to much broader fields of application.



BECKMAN INFRARED SPECTROPHOTOMETER
MODEL IR2

SHOWING SPECTROPHOTOMETER WITH SYNCHRONOUS MOTOR WAVELENGTH DRIVE ATTA... AND HANDLING SYSTEM AND CONSTANT TEMPERATURE BATH CONV...

The Beckman IR2 Infrared Spectrophotometer is years ahead of any other infrared equipment because into its design Beckman engineers have incorporated the ideas, user-suggestions and first-hand experience gained from the long period of pioneer work in butadiene and 100-octane applications—two of industry's greatest war-time achievements. To enable you to fully understand the really important advancements incorporated into the IR2, a new twelve page Beckman Bulletin has been issued describing the IR2 in detail. A copy of this Bulletin will gladly be sent you on request. Write today while ample supplies are available. *Beckman Instruments, National Technical Laboratories, South Pasadena 17, Calif.*

A FEW OF THE IR2 ADVANCEMENTS DESCRIBED AND ILLUSTRATED IN THIS BULLETIN

MAXIMUM VERSATILITY: Illustrations and descriptive matter show how the IR2 handles liquid and solid samples as well as gases . . . how its light sources, cell holders and other elements are interchangeable . . . how these and other features insure maximum adaptability to varying applications.

ELIMINATION OF FALSE ENERGY AND ZERO DRIFT: This important feature is described, and illustrated with typical data and charts.

ELIMINATION OF TEMPERATURE CORRECTION: The method of thermostatting the instrument against temperature variations is described and the importance of this feature explained.

ELIMINATION OF GALVANOMETERS: Beam modulation, energy receiver and electronic amplifier are described, showing how they eliminate the temperature, non-linearity and vibration difficulties associated with galvanometers.

IN ADDITION, internal views of the instrument, light path diagrams, typical recorded curves and many other valuable IR2 features are contained in this Bulletin. It is an invaluable aid to anyone contemplating the purchase of infrared equipment for it gives detailed facts on the latest infrared advancements!

BECKMAN INSTRUMENTS CONTROL MODERN INDUSTRIES

NEW PRODUCTS & PROCESSES

Phosphate Fertilizer NP 382

A newphosphate fertilizer, produced by fusing olivine, a magnesium iron silicate, with phosphate rock, was announced by Manganese Products, Inc., at the Western Regional Meeting of the American Institute of Chemical Engineers in San Francisco.

This process, developed largely in recent years by engineers of the Tennessee Valley Authority, utilizes an electric furnace for the reaction. This takes place at a temperature of about 1500° C. where the two rock materials react and fuse, the resultant molten slag being hit by a stream of high-velocity water as it is run out of the furnace for granulation of the product. These granules are then dried and sized.

The finished product differs from ordinary superphosphate in that it has an alkaline instead of an acid reaction, making it particularly suitable for certain types of soils. Its high magnesium content is also of value for those soils having a deficiency of this element, it is stated.

Silicone Vacuum Pump Oil NP 383

Never before have there been diffusion pump oils able to produce vacua ranging up to 5×10^{-8} mm. Hg, and yet able to withstand exposure to air and moisture at operating temperatures without appreciable decomposition. These two new silicone diffusion pump fluids, DC 702 and DC 703, have that highly desirable combination of properties.

They are rapidly being adopted for use in electron microscopes, metal evaporator systems; in the production of vacuum tubes, and in the dehydration of foods and pharmaceuticals. Among the advantages reported for these silicone diffusion pump fluids are vopor pressures as low or lower than those of the best organic diffusion pump oils; much more rapid recovery time after exposure to the atmosphere at operating temperatures; freedom from decomposition and the resultant fouling of heater surfaces; and improved performance of fore-pumps.

Aluminum Silicate Absorbent NP 384

A new oil, grease, and water absorbent produced from a unique alumina silicate material and capable of absorbing from 120 to 140 per cent of its own weight has been announced by the Blue Mountain Clay Co., Inc. It will appear on the market this Fall. Used on oily, greasy, or wet floors, the absorbent eliminates danger of accidents due to slipping, at the same time keeping floors clean and minimizing chances of flash fires.

This granular absorbent material is free of dust and non-abrasive and will be "tailor-made" to give maximum service to the user without sacrificing its absorption qualities. Weighing up to 30 lbs. per cu. ft., the manufacturers maintain that it gives a greater coverage per pound than any other similar mineral product.

RDX Finds Commercial Use NP 385

RDX, the war's most powerful chemical explosive, is the basic charge of the radically new Western "Big Inch" blasting fuse cap, it was announced by F. S. Elfred, Jr., general manager of the explosives division of Olin Industries, Inc.

This is the first known commercial use of RDX, the devastating explosive which made the blockbuster Europe's most fearsome aerial bomb.

Also known as cyclonite, RDX was one of the most closely guarded secrets of the war. Because of its tremendous power, it has made possible the smallest blasting cap ever developed. With 50 per cent more power than TNT, RDX has a rate of detonation which surpasses that of any other commercial explosives.

The length of the new cap is hardly more than 1⅛" and less than ¼" in diameter. This is about ½" shorter than conventional caps. Being made of shining aluminum, the new caps are more easily found when accidentally dropped on dark mine floors.

Although powerful, the new "Big Inch" caps are safer to handle. They can withstand the shock of a heavy impact without detonating. The "Big Inch" cap can be used in all types of blasting requiring the use of fuse caps, such as quarries, open pits, metal mines, highway excavation, and construction work.

Smokeless Coal NP 386

"Smog," bane of industrial cities using soft coal, may soon be a thing of the past if a radical process for making new type of smokeless fuel from western soft coals is successful. The process is now being tested in Salt Lake City, and if it works out as anticipated by engineers, smoke nuisance will be eliminated according to Mr. George W. Carter, chief engineer of Coal Logs, Inc., of Salt Lake City.

The process, developed experimentally over a period of some seven years, is now ready for testing in a new semi-commercial plant in Salt Lake City capable of treating 50 tons of coal daily. An invention of Mr. K. L. Storrs, president of the firm, the process will also make available important new chemicals for a wide variety of industrial uses.

Finely-divided coal is passed continuously through a heated horizontal retort which is vibrated at a controlled intensity. At a temperature of about 500° C. the coal becomes semi-plastic and can be compressed and extruded in the form of long, hard "logs" about 2 inches in diameter. Only 3 minutes are required to convert the powdered coal into smokeless logs ready to use in stoves, furnaces or open fireplaces. The chemical by-products are recovered during the heating process. By a relatively simple modification of this process, a coke can be obtained that would be especially useful in practically all metallurgical industries.

Allergy Relief NP 387

Ciba Pharmaceutical Products, Inc., has introduced the new anti-histaminic drug,

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (10-6)

Please send me more information, if available, on the following items. I understand that nothing further may be available on some of them.

NP 382	NP 386	NP 390	NP 395
NP 383	NP 387	NP 391	NP 396
NP 384	NP 388	NP 392	NP 397
NP 385	NP 389	NP 393	NP 398
		NP 394	NP 399

Name ..... (Position) .....

Company .....

Street .....

City ..... Zone .... State .....

Briefs for your notebook on some

ORGANIC COMPOUNDS and INTERMEDIATES

recently announced by

COLUMBIA'S TECHNICAL STAFF

THIONYL CHLORIDE

$SOCl_2$

A useful reagent for reactions involving organic compounds. May be used in the conversion of organic acids to acid chlorides, and in other chlorination as well as in dehydration reactions. *Ask for Technical Bulletin T-308.*

DIGLYCOL CHLOROFORMATE

[Diethylene Glycol Bis(chloroformate)]

$$O(CH_2CH_2{-}O{-}CO{-}Cl)_2$$

An intermediate reactive with alcohols or amines . . . non-volatile . . . relatively easy to handle. Suggested fields of applications—Pharmaceuticals, Rubber, Paints, Resins and Plastics. *Ask for Technical Bulletin T-100.*

DIGLYCOL CARBAMATE

(Diethylene Glycol Dicarbamate)

$$O(CH_2CH_2OCONH_2)_2$$

A white crystalline organic compound which condenses with formaldehyde to produce tough, colorless resins. May be used to give greater flexibility and strength to urea-, melamine-, and phenol-formaldehyde resins. *Ask for Technical Bulletin T-306.*

ALLYL DIGLYCOL CARBONATE

(*Formerly Allymer CR39*)

[Diethylene Glycol Bis(allyl carbonate)]

$$O(CH_2CH_2{-}O{-}CO{-}O{-}CH_2{-}CH{=}CH_2)_2$$

A colorless organic ester useful as a solvent or plasticizer of low volatility, and for the production of resins of the thermosetting allyl type. When heated in the presence of a peroxide catalyst, it solidifies into a hard, insoluble, infusible, glass-clear material. Also suggested as a base for organic synthesis. *Ask for Technical Bulletin T-304.*

DIMETHYL CARBONATE

$$CH_3{-}O{-}\overset{\overset{O}{\|}}{C}{-}O{-}CH_3$$

A colorless liquid, low-boiling, alkyl carbonate ester. Miscible with a large number of common organic solvents, and a solvent for a variety of resins and plastics. May be used as an intermediate in organic synthesis for the preparation of a variety of compounds. *Ask for Technical Bulletin T-307.*

4 Colorless Liquid Organic Ether-Esters of Low Volatility and High Boiling Points

May be used as plasticizers, high-boiling solvents, softening agents and intermediates.

PHENYL DIGLYCOL CARBONATE

[Diethylene Glycol Bis(phenylcarbonate)]

$$O(CH_2CH_2OCOO{-}C_6H_5)_2$$

Ask for Technical Bulletin T-302

BUTOXYETHYL DIGLYCOL CARBONATE

[Diethylene Glycol Bis(2-n-butoxyethyl carbonate)]

$$O(CH_2CH_2OCOOCH_2CH_2OCH_2CH_2CH_2CH_3)_2$$

Ask for Technical Bulletin T-301

BUTYL DIGLYCOL CARBONATE

[Diethylene Glycol Bis(n-butylcarbonate)]

$$O(CH_2CH_2OCOOCH_2CH_2CH_2CH_3)_2$$

Ask for Technical Bulletin T-300

CRESYL DIGLYCOL CARBONATE

[Diethylene Glycol Bis(cresylcarbonate)]

$$O(CH_2CH_2OCOOC_6H_4CH_3)_2$$

Ask for Technical Bulletin T-305

Physical properties, specifications and similar data are contained in the Technical Bulletins noted above. These bulletins are 8½"x 11½", punched for standard 3-ring binders. We shall be glad to send you copies on any of these Columbia products which may warrant your further investigation. Please write us on your company letterhead.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY

COLUMBIA CHEMICAL DIVISION

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Soda Ash • Caustic Soda • Liquid Chlorine • Sodium Bicarbonate • Pittchlor (*Calcium Hypochlorite*) • Silene EF (*Hydrated Calcium Silicate*) • Calcium Chloride • Soda Briquettes (*Iron Desulphurizer*) • Modified Sodas • Caustic Ash • Phosflake (*Bottle Washer*) • CalceneT (*Precipitated Calcium Carbonate*)

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AMMONIUM SILICO FLUORIDE

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SODIUM SILICO FLUORIDE

ZINC SILICO FLUORIDE

POTASSIUM SILICO FLUORIDE

HENRY SUNDHEIMER COMPANY

Established 1908

103 Park Ave. New York 17, N. Y.

Pyribenzamine, also referred to as P B Z. Chemically, it is N′-pyridyl-N′-benzyl-N-dimethyl-ethylene diamine hydrochloride. Extensive laboratory and clinical work has demonstrated the ability of Pyribenzamine to relieve many symptoms of allergy. In seasonal hay fever 85% of patients treated with P B Z were relieved; in the non-seasonal Allergic Rhinitis (extrinsic form), 73% benefited. Favorable results were obtained in urticaria in 95% of acute attacks . . . 70% of chronic. In seasonal bronchial asthma the accompanying rhinitis improved in 79% . . . the asthma in approximately 50%. Gratifying results have been attained in other allergic manifestations.

Non-Irritating Color Developer NP 388

The Ansco Division of General Aniline and Film Corporation has announced an important advance in color film processing in the form of a new color developing agent for color films and color paper.

It is well known that the color developing agent presently used in current color photographic processes has the disadvantage of causing a minor skin irritation or dermatitis with certain individuals who are sensitive to it. This annoyance is eliminated by the use of the new developing agent, which, without any sacrifice in color quality, is free of this property, being no more toxic than the devolopers used in ordinary black and white photography.

It is felt that this advance will be welcomed by those individuals who have found themselves to be sensitive to the presently used developing substance.

Plastic-Coated Work Gloves NP 389

Monsanto Chemical Company has predicted that plastic-coated fabrics will be used in many of the 200 million pairs of work gloves which Americans will buy in 1947.

In the current leather shortage, the company said, glove manufacturers have turned to vinyl butyral, experimentally producing models of lighter weight, improved grip, greater risistance to soiling, and comparable wearing properties.

At the end of the work day, the wearer can use a solvent to remove the oil and grime from the plastic-coated surfaces. The tough, flexible plastic also is relatively unaffected by repeated launderings.

Indications are that first gloves using vinyl butyral will reach retail sales counters this fall and that they will be in the price range of familiar so-called combination work gloves.

Silicone Paint NP 390

A new silicone paint that will afford life-time finish for automobiles, refrigerators, electric ranges and hospital equip-

HEYDEN Chemicals for

FORMALDEHYDE

37% U.S.P. Solution. Uniform in strength and high in purity. Low acid and metals content. Available in quantities to meet individual requirements — from tank cars of 72,000 lbs. to bottles of 1, 5 and 9 lbs.

PARAFORMALDEHYDE

Packaged in 100 pound drums. Powdered or granular types are available.

PENTEK*

(Pentaerythritol, Technical)

Used in alkyd resins, synthetic resins and coating compositions where good water resistance, rapid bodying, excellent durability and speedy drying is desired.

HEXAMETHYLENETETRAMINE

Technical granules and powder available. Packed in 200 pound barrels.

*Trade Mark — U. S. Pat. Off.

FINE HEYDEN CHEMICALS

HEYDEN *Chemical Corporation*

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Chicago Sales Office: 180 N. Wacker Drive, Chicago 6, Ill.

Benzaldehyde • Benzoates • Benzoic Acid • Benzyl Chloride • Bromides • Chlorinated Aromatics • Medicinal Creosotes • Formates • Formaldehyde • Formic Acid
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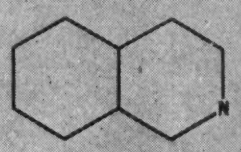
REILLY

Isoquinolines

The Reilly Isoquinolines are but two of the more than twenty-five coal tar bases that have been made available in refined form through Reilly research. While these bases have only recently become commercial products, they have already achieved an important place in the field of useful organic chemicals.

Reilly Coal Tar Bases are used in the manufacture of vitamins, synthetic rubber, medicinals, waterproofed cloth, insecticides, wetting agents, fungicides, inhibitors for steel pickling, rubber accelerators, polymerization modifiers, germicides —and a host of other products.

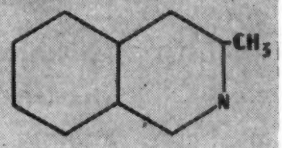
ISOQUINOLINE



Physical Constants of the Pure Compound

Molecular Weight ...129.06
Freezing Point ..... 25.6 °C
Boiling Point.....243.2 °C

3-Methylisoquinoline



Physical Constants of the Pure Compound

Molecular Weight ...143.08
Freezing Point .....64.6 °C
Boiling Point.....252.2 °C

This 56 page booklet and supplement, describing the complete line of Reilly Coal Tar Chemicals, Oils, Acids, Bases and Intermediates, will be sent on request.

Reilly Coal Tar Chemicals for Industry

REILLY TAR & CHEMICAL CORPORATION
Merchants Bank Bldg., Indianapolis 4, Ind.
500 Fifth Ave., New York 18 • 2513 S. Damen Ave., Chicago 8

ment is being developed by the General Electric chemical department.

Company officials stated that progress being made in the development of silicones, the new materials derived from sand, indicate that within five years, automobiles, refrigerators, ranges and hospital equipment will be finished with a silicone paint that will retain its original color and gloss indefinitely. In addition, it is expected that brighter and more clear colors will be obtained with the silicone materials.

Tests of the paint, still in the devolopmental stage at General Electric, show that the silicone product is highly resistant to severe weather conditions, chemicals and heat.

Liquid Soap Extension NP 391

A method of extending liquid scrub soaps by 100 per cent without increasing fat consumption has been announced by the Rohm & Haas Company of Philadelphia. Coming at a time when the fatty acid shortage is particularly acute, the new formulation, cutting soap content of the finished product to 9-10 per cent, is already finding widespread acceptance by manufacturers.

It is reported that the formulation not only gives results equivalent to those obtained from standard liquid soaps from the standpoint of detergency, but in addition it adds wetting power, improves rinsability and proves highly effective in hard water.

Although any given formulation frequently must be adjusted slightly to accommodate the particular type of fatty acid base employed by the soap manufacturer, the company recommends a basic formula containing .4% methyl cellulose, 44.5% water, 0.1% Tanol NNO, 5% Triton X-300, and 50% liquid potash soap (18-20% soap). Methyl cellulose is manufactured under various trade names by other chemical companies.

The basic extending ingredient is Triton X-300, one of a group of synthetic wetting agents, which for years have been widely used in the textile industry for scouring, penetrating, and leveling.

The formulation gives a clear solution with better viscosity than that of standard scrub soaps. It has been tested with 20% corn oil soap, 20% coconut oil soap and standard trade name soaps made with tall and linseed oil fatty acids. In every case the formula did not reduce the foam and gave good results from the standpoint of detergency.

Insulating Resin NP 392

A special, fast-drying synthetic resin base insulating solution is manufactured by Buchanan Associates, Inc. It has high dielectric strength, and is resistant to salt spray, water, oil, heat, moisture, corrosion, etc. The material can be used by either brush or spray. It protects motors, coils, magnetos, ignition systems

2,4-D Formulations

ODIUM SALT • METHYL ESTER • N-AMYL ESTER • MORPHOLINE SALT

THIS advertisement is addressed to the executives of a relatively few companies.

It is addressed to those who see a great future in formulated concentrates of 2,4-Dichlorphenoxyacetic Acid—ready for dilution by the user.

We would like to talk to those executives who have not only the desire but the marketing facilities to distribute one or more of these products.

There are many sales opportunities in the broad fields of agriculture, where a general purpose weed killer such as a sodium salt formulation is most economical and effective. For more resistant types of growth the Ester formulations are indicated. Baker formulations have been designed to cover both markets.

If your company is primarily sales minded—feeling that others who have a trained research staff and up-to-the-minute manufacturing facilities are better fitted to keep your product up to date and at less cost—your inquiry is invited.

Appointments with our Sales and Technical executives will be arranged at mutual convenience. Address: Organic Chemical Sales Division, J. T. Baker Chemical Co., *Executive Offices,* Phillipsburg, N. J.

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

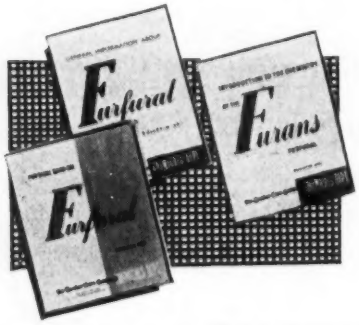
WHEN VALUABLE MATERIALS ARE KEEPING BAD COMPANY RESCUE THEM WITH *Furfural*

If you are throwing away the good with the bad in your waste products because you cannot make a separation, you should see if Furfural can help you. The selective solvent properties of this versatile aldehyde are being profitably utilized on a large scale in many different fields.

In the refining of lubricating oils, purification of wood rosin, and of tall oil and sulfate turpentine, Furfural has already been put to use for removing "bad" constituents from the "good".

Another method of Furfural rescue is the separation of two potentially useful materials from each other, such as is done in the Furfural processes for extraction of C_4 hydrocarbons in making butadiene, and in glyceride oil refining. Result: two fractions are obtained, each with enhanced use value. In these processes virtually all the Furfural is recovered for repeated use, making extraction costs very low.

The above are only a few of the possible selective solvent uses for Furfural. This economical aldehyde is readily available and we believe its service to industry is still in its infancy. Furfural is available for your investigation; please make a request on your company letterhead.



More complete information on Furfural, its chemistry, physical characteristics and uses are contained in the Series of Bulletins we are publishing. Those now available are listed below. Write for those which are of interest to you.

Bulletin 201
General Information about Furfural.

Bulletins 202, 203
Introduction to the Chemistry of the Furans, and *Physical Data on Furfural*, of interest primarily to the research worker.

PROPERTIES OF FURFURAL

Molecular Weight	96.08
Freezing Point, °C	—37
Boiling Range (99%)°C	157 to 167
Specific Gravity (20/20°C)	1.161
Flash Point (open cup)°C	56
Refractive Index (20/D)	1.5261
Surface Tension at 20° C (dynes/cm)	49
Viscosity at 38°C (centipoises)	1.35

Solubility: Completely miscible with ethyl alcohol, ether, acetone, benzol, butyl acetate, china wood oil and most organic solvents except paraffin hydrocarbons and glycerol; 8.13% by wt. in water at 20°C.

Analysis:

Furfural, minimum %	*99.5
Water, maximum %	0.2
Organic Acidity, Maximum equiv/1	0.023
Ash, maximum %	0.006
Mineral Acidity	None
Sulfates	None

*As determined by A.O.A.C. method.

Standard Containers: 9, 45, 90, and 520 lb. Drums
†Carload of Drums
80 to 88 ..... 41,600 to 45,760 lbs.
Tank car 8,000 gal. ..... 78,000 lbs.
Tank car 10,000 gal. ..... 98,000 lbs.
†ODT requires maximum loading

Drums non-returnable

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FURFURAL • FURFURYL ALCOHOL • FUROIC ACID • TETRAHYDROFURFURYL ALCOHOL

of all types of combustion engines, marine, diesel, etc., pumps, dynamometers, generators, compressors, batteries and all forms of electrical equipment. The dielectric strength of a one mil. film is 1030 volts.

Continuous Mg Process NP 393

Magnesium will soon be made on the West Coast by an improved and continuous process cheaper than ever before, according to a disclosure made before the Western Regional meeting of the American Institute of Chemical Engineers in San Francisco. A. C. Byrns, of Permanente Metals Corp., a Henry J. Kaiser subsidiary, revealed that chemical engineers are streamlining the process and plant, operated during the war at Permanente, California. The plant, scheduled to resume operations in the near future, will be the sole producer of magnesium metal in the entire west. According to the Kaiser organization, the improved process will be able to produce magnesium metal cheaper than any other method now in use in the United States and will thus be an important factor in the expanding use of this metal in the transportation, equipment, building, and other vital industries.

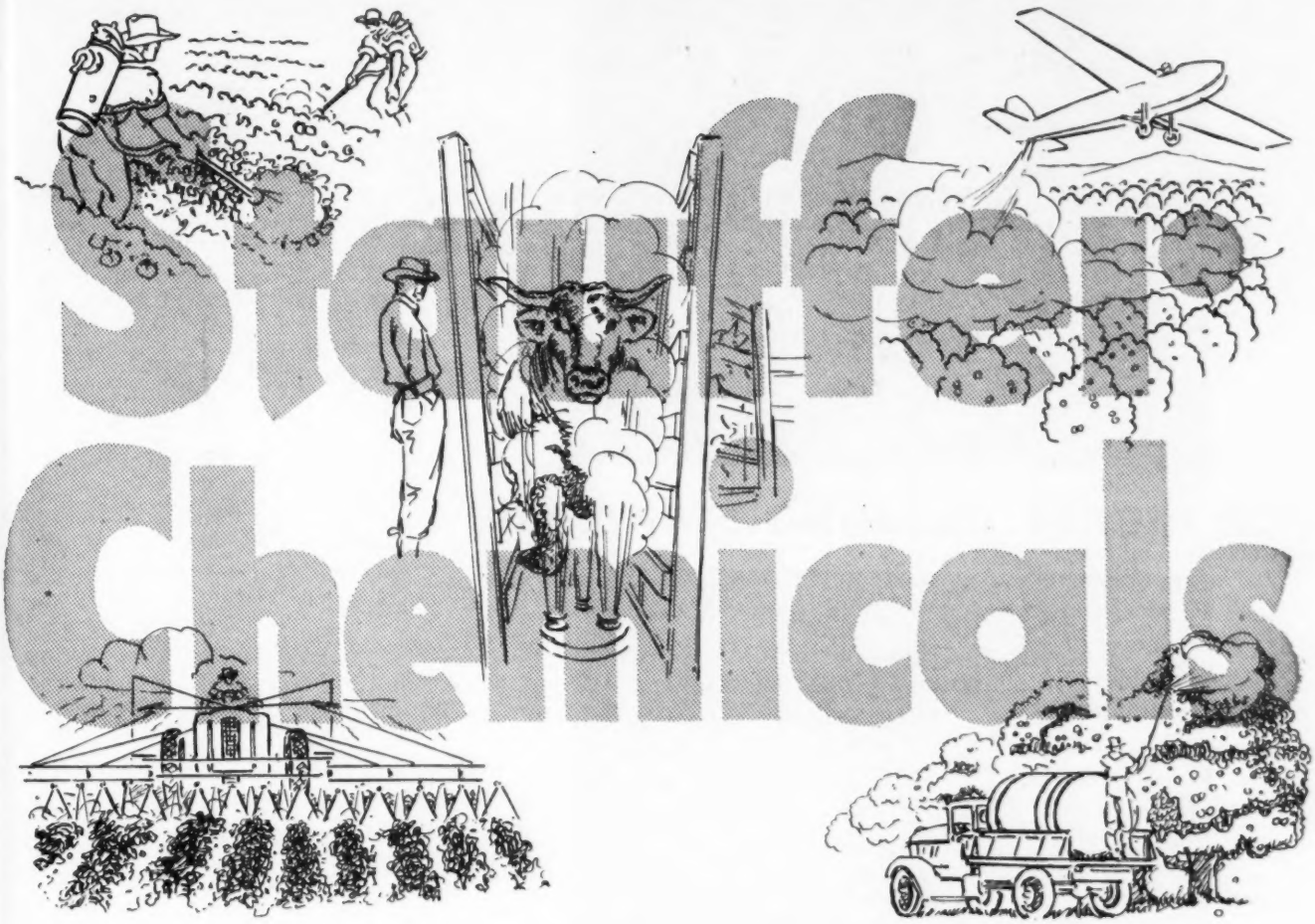
In discussing the process, Dr. Byrns disclosed that the essential steps in the plant consist of reacting common dolomite rock, together with magnesia obtained from seawater, with coke from petroleum refineries in big furnaces through which electricity is passed. At a very high temperature (1900° C.) the magnesium metal comes out of the furnace in the form of a gaseous dust. This dust is collected and compacted into pellet form and charged into electrically-heated retorts from which, at a high temperature and under vacuum, the magnesium metal is purified, and crystallized. The high-purity crystals are melted, alloyed and poured into ingots which are then ready to be used in the magic role of magnesium throughout the industries of the nation.

As used during the war, the Permanente (or carbothermic process) made magnesium in batches, but this method will be switched to a stream-lined, continuous process that will greatly reduce production costs.

Silicone Oil Releases Molds NP 394

Faster and improved production of molded mica parts has been reported by the General Electric Company with the utilization of its own silicone oil as a mold release agent.

Engineers revealed that silicone oil is being used as a lubricant in molding both shellac and Glyptal bonded mica and report that application results in a freedom from carbon and other decompo-



FOR AGRICULTURE

Sulphur is the most widely used agricultural fungicide and Stauffer is the largest producer of wettable, dusting and stock dip grades. Other Stauffer agricultural chemicals include cryolite, carbon bisulphide and DDT mixtures.

Look to Stauffer for quality chemicals in quantity.

STAUFFER PRODUCTS

*Aluminum Sulphate
Borax
Boric Acid
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlorine
Citric Acid
*Copperas
Cream of Tartar
Muriatic Acid
Nitric Acid
Silicon Tetrachloride
Sodium Hydrosulphide
Stripper, Textile
Sulphur
Sulphuric Acid
Sulphur Chloride
*Superphosphate
Tartar Emetic
Tartaric Acid
Titanium Tetrachloride

(*Items marked with star are sold on West Coast only.)

STAUFFER CHEMICAL COMPANY

Stauffer CHEMICALS SINCE 1885

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221 North LaSalle Street, Chicago 1, Illinois
424 Ohio Bldg., Akron 8, Ohio—Apopka, Fla.
555 South Flower Street, Los Angeles 13, Cal.
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FOR HIGHER CLEANING STANDARDS

BE SPECIFIC . . . *say Metso!*

Yes, motors are greaseless, paper pulp whiter, floors and hundreds of other things cleaner when you use Metso Detergents*. In Metso the working components are balanced, one part sodium oxide (Na_2O), and one part soluble silica (SiO_2). This combination accelerates wetting action, emulsification, deflocculation; then, the SiO_2 performs the added unique function of preventing the removed dirt from redepositing on clean surfaces.

How many cleaning operations in your plant can be improved? Evaluate the faster, efficient performance of Metso balanced soluble silica detergents in each. Requests for samples and directions receive prompt attention.

PHILADELPHIA QUARTZ COMPANY

Dept. A, 119 South Third Street, Philadelphia 6, Pa.
Chicago Sales Office: Eng. Bldg., 205 West Wacker Drive, 6

metso BALANCED DETERGENTS

*Metso Granular, Sodium Metasilicate (U.S. Pat. 1898707)
Metso 99, Sodium Sesquisilicate (U.S. Pats. 1948730, 2145749)

sition products which adversely affect the electrical properties of the mica. They also disclosed a marked reduction in rejected pieces caused when parts were broken in being removed from the mold. This feature of the silicone oil plus the fact that its use saves time formerly spent in cleaning gummy decomposition products from the mold has resulted in greater production of the finished mica parts, they said.

The high temperature stability of silicone oil together with its low surface tension enables the mold operator to apply the silicone oil readily to all sections of the mold while still heated, engineers reported.

Mildewproofing Agent NP 395

Announcement has been made of the development of a new mildewproofing compound in the laboratories of the Rohm & Haas Co. Effective against a wide variety of destructive fungi, the new material, known as Hyamine 3258, is of particular interest for preventing fungus growths on cellar and closet walls and for mildewproofing shoes and other leather goods.

Containing 40% active fungicide, Hyamine 3258 is a light tan paste which may be made fluid by heating to 80°F. A water dispersal quaternary ammonium pentachlorophenate, it combines synergistically the anti-fungal properties of quarternary ammonium salts with those of the chlorophenates. A typical mildewproofing formulation consists of approximately 10% Hyamine 3258 with a small amount of ispropanol and a wetting agent such as Triton X-155—all in water solution.

Further applications under study include its use in dry cleaning formulations, in the treatment of storage bins used for food and other products, and for mildewproofing many other objects used around the home or farm including such diverse things as rope, fence posts, and fruit and vegetable baskets or crates. In the commercial field, the treatment of warehouses and cold storage rooms in which fruits, vegetables and meats are stored has been suggested. The material is also effective as a preservative in cosmetic preparations and shows possibilities, in combination with a water soluble insecticide, for combined protection against mildew and moth damage.

Further Invert Sugar Use Foreseen NP 396

Of interest to manufacturers and chemists who use invert sugar in the preparation of beverages, baked goods, ice cream and food products, a comprehensive survey of scientific information about "Invertase and Invertase Concentrates", prepared by Dr. Carl Neuberg of New York University, details the results of 50 years

TERGITOL WETTING AGENTS

TRADE-MARK

Are stable... efficient... economical

The three "Tergitol" wetting agents are powerful surface-tension depressants and have a wide variety of uses. Water solutions containing as much as 20 per cent dissolved materials such as acids, bases, salts or dyestuffs, can be made to spread more evenly or penetrate faster using a "Tergitol" wetting agent. As little as 0.1 per cent of a "Tergitol" compound in an aqueous solution will produce:

Rapid and Uniform Penetration of porous materials such as textile fibers, paper, and leather.

Quick Wetting of pigments, dyestuffs, powders, clay, cement, dust, and other dry articles.

Effective Surface Spreading on glass, metal, wood, plastics, or foliage surfaces which ordinarily resist wetting.

Emulsification of many oils, resins, and chlorinated or water-insoluble solvents.

De-emulsification of many water-oil and solvent-water emulsions.

Additional technical information is available. Ask our nearest office for Form 5900.

"Tergitol" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

"TERGITOL" 7

. . . most efficient for dilute aqueous solutions containing less than one per cent dissolved solids. Under such conditions it is one of the most powerful commercial wetting agents.

"TERGITOL" 4

. . . a superior wetting agent for more concentrated solutions, containing from one to five per cent dissolved materials. It is stable, even under the conditions encountered in wool carbonizing and cotton stock bleaching.

"TERGITOL" 08

. . . most effective for highly concentrated solutions of acids, bases, salts, or dyestuffs. Because of its solubility, chemical stability, and penetrative action in these solutions, it is a remarkable assistant wherever such conditions are met.

SYNTHETIC ORGANIC CHEMICALS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

UCC

30 East 42nd Street, New York 17, N. Y.

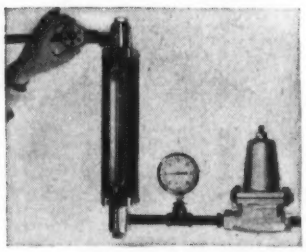
Offices in Principal Cities

Use ANSUL SO_2 and Avoid...

TYPICAL ANALYSIS COMPARISON

Chemical	Ansul Liquid Sulfur Dioxide	Burner Gas	
		Poor Operation	Very Efficient Operation
SO_2	99.9+%	4.90%	19.08%
SO_3	0.00	1.95	0.10
H_2O	less than 0.01	1.47	0.40
S (Sublimed)	0.00	0.49	0.10
N_2	less than 0.10 (L.P.)	76.50	78.32
O_2		13.72	1.00
A		.97	1.00
Ash	0.00	Trace	Trace

An Easy-to-Install Ansul SO_2 System Gives You These Four Important Advantages



HIGHER PURITY—Elimination of impurities inherent in burner gas (Ansul Liquid SO_2 is 99.9+% [by weight] PURE).

GREATER ECONOMY—Small investment in equipment, materially reduced operating and maintenance costs, and freeing of valuable floor space.

FINGER-TIP CONTROL—Easy, positive, finger-tip control providing extreme accuracy for reaction or adjustment of pH.

GREATER SOLUBILITY—Solubility in water is 4 to 5 times greater than SO_2 from burner gas.

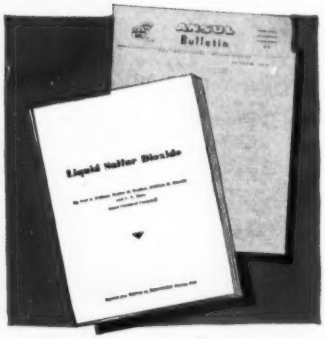
WRITE THE ANSUL TECHNICAL STAFF FOR FURTHER INFORMATION

LIQUID Sulfur Dioxide BY ANSUL

PHYSICAL PROPERTIES

Chemical formula	SO_2
Molecular weight	64.06
Color (gas and liquid)	Colorless
Odor	Characteristic, pungent
Melting point	−103.9° F. (−75.5° C.)
Boiling point	14.0° F. (−10.0° C.)
Density of liquid at 80° F.	(85.03 lbs. per cu. ft.)
Specific gravity at 80° F.	1.363
Density of gas at 0° C. and 760 mm	2.9267 grams per liter (0.1827 lb. per cu. ft.)
Critical temperature	314.82° F. (157.12° C.)
Critical pressure	1141.5 lbs. per sq. in. abs.
Solubility	Soluble in water
Purity	99.9+% (by wt.) SO_2 (H_2O less than 0.01%)

*REG. U. S. PAT. OFF.



Send for Bulletin 020.1, "A Comparison of Ansul SO_2 and Sulfur Burner Gas," and also for your copy of "Liquid Sulfur Dioxide"—a treatise on the properties, characteristics, and industrial uses of Liquid Sulfur Dioxide—written by the Ansul Technical Staff. *WRITE Dept. D.*

Also Manufacturers of Methyl Chloride

ANSUL CHEMICAL COMPANY
INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WIS.
Eastern Office: 60 E. 42nd St., New York City

of research on the activity of this enzyme.

According to the report, invertase has a promising future in the food field where statutory restrictions may prohibit the use of chemically treated ingredients in commercial products.

Corrosion-Resistant Paint NP 397

A product of Buchanan Associates, Inc., is a plastic anti-corrosive paint. The material has good flexibility, adhesion, and is extremely tough and durable. It is non-saponifiable and resistant to grease, oil, acid, alkali, water, alcohol and abrasion. It dries rapidly without paint odor and is excellent for use in chemical plants, dairies, etc., and all places where painted surfaces are subject to chemical fumes, etc., or washed with strong caustics. It is supplied in several colors.

Cement Tubes Cut Down Waste NP 398

A new packaging idea, recently developed by Maas & Waldstein Co., is based on a survey that found that a little cement goes a long way.

It was found that unnecessarily large quantities of cement were being used in various assembly operations and that by supplying small tubes of cement, instead of bulk, to the assembly personnel, most of this cement wastage was eliminated. Accordingly, Maas & Waldstein now packages two of its widely used water-resistant industrial cements, namely, General Purpose Cement #54 and Spot Cement #76 in two-ounce collapsible tubes as well as in larger commercial packages.

Industrial Adhesive NP 399

A new industrial adhesive that requires no catalyst or special preparation for use has been developed my E. I. du Pont de Nemours & Co.

A six months' minimum package stability with no tendency to get inside of a year are claimed for the cement.

No. 4665 is described as being tough and flexible, suitable for bonding metal foils and metal sheets to wood, plastics, vulcanized synthetic and natural rubbers, as well as other substances having widely different coefficients of thermal expansion.

It can be applied without thinning, by brushing, roller coating, knife coating, or dipping. It contains 27.5 per cent solids. Although insoluble in water, its bond strength is lowered by continued immersion. However, original bond strength is regained after removal from water.

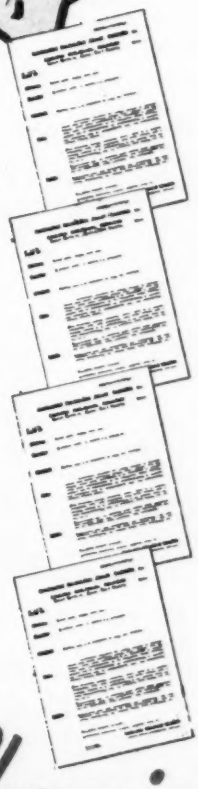
The dried adhesive film is resistant to dilute alkalis, acids, and corrosive salt solutions, and is not attacked by petroleum or coal-tar solvents, lubricating oils, alcohols, ethylene glycol, or vegetable oils, but is soluble in ketones or ester solvents. Moreover, the cement is resistant to mildew and fungi.

FOR DEPENDABLE SUPPLY AND SERVICE
PLACE 1947 CONTRACTS EARLY!

for SPENCER

INDUSTRIAL (NH_3) ANHYDROUS AMMONIA

Now is the time to contract for your 1947 requirements of Spencer Industrial Anhydrous Ammonia (NH_3) and assure your future production schedules for the manufacture of *Fertilizers, Explosives, Petroleum Products, Chemicals, Sulphuric Acids, Rayon, Wood Pulp Treating, Refrigerants . . .*



CONTRACT orders mean a sure supply of 99.5% pure Spencer Anhydrous Ammonia.

CONTRACT orders mean prompt delivery throughout 1947.

CONTRACT orders mean price protection—full protection against market fluctuations.

CONTRACT orders mean good business—enable you to reduce inventories and plan with certainty for orderly economical production.

Spencer Chemical
COMPANY

CHEMICALS

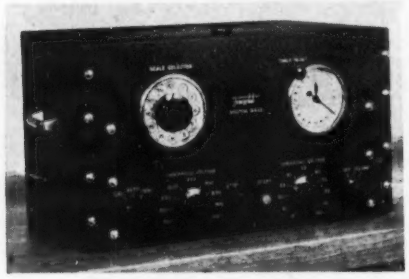
General and Sales Offices: Dwight Building, Kansas City 6, Mo.
Works: Pittsburg, Kansas

ON CONTRACT . . . ON SCHEDULE . . . ON TIME

NEW EQUIPMENT

Radioactivity Measurement QC 952

Tracerlab, Inc., announces the Autoscaler, an instrument for making quantitative measurements of radioactivity. This instrument is a line-operated device which



(1) supplies the high potential for a Geiger-Mueller tube, (2) counts the impulses from this tube, and (3) measures the time required for the reception of a given number of impulses. This instrument provides (1) automatic operation with no internal adjustments; (2) automatic stops after a predetermined number of counts up to 4096 to provide a relay control contact; (3) a self-contained unit, including high voltage supply, precision timer and electronic counting circuit; (4) short resolving time; (5) self-calibration; (6) usable with all standard Geiger-Mueller tubes; and (7) a fixed statistical error for each setting of the scale selector switch.

Impulses from the Geiger counter are fed to a preamplifier, a 2-stage amplifier, and then a multivibrator which triggers the first of a series of twelve "scale by two" counter circuits. The latter can be selected by the switch shown in the upper left of the photograph to provide a predetermined number of impulses from 2 to the second power to 2 to the twelfth power —i.e., 4 to 4096 in integral powers of 2. The statistical error involved in the measurement of an average counting rate by timing a finite number of random impulses is determined by the total number of impulses timed. In the Autoscaler, predetermined counts of 128, 256, 512, 1024, 2048, or 4096 corresponded to fixed probable errors of approximately 6, 4, 3, 2, 1.5, and 1%.

Coupling QC 953

A new coupling for machines requiring maximum flexibility, has been developed by the Lovejoy Flexible Coupling Co. CX Double-flex cannot fall off when

driving, and driven units are separated for servicings.

Of one-unit construction, this coupling comes out with the shaft when pump or motor is moved. A standard L-R body is permanently inserted into the molded synthetic rubber unit, this being permanently secured to the pump shaft by a setscrew. Molded into the other end are the L-R sockets that engage L-R jaws on the blower hub.

Other advantages of the Type CX Double-flex are: Quick assembly in dark or close quarters, no metal to metal contact, tight fit—no rattle, deeper center hole allowing shaft to extend ½" into unit. Six sizes from 2¼" to 5" long.

Rubber Cushions QC 954

Three new Vibro-Insulators, devices of rubber and metal to cushion industrial and manufacturers original equipment of all types, have been added to the line of The B. F. Goodrich Co. The three new products are listed as No. 130, 133, and 144.

Type 130 carries maximum recommended load of 132 lbs. with the maximum deflection at that load 3/16", and the minimum disturbing frequency 1200 per min.

Maximum recommended load type 133 is 180 lbs., maximum deflection at that load 5/32" and minimum disturbing frequency 1200 per min.

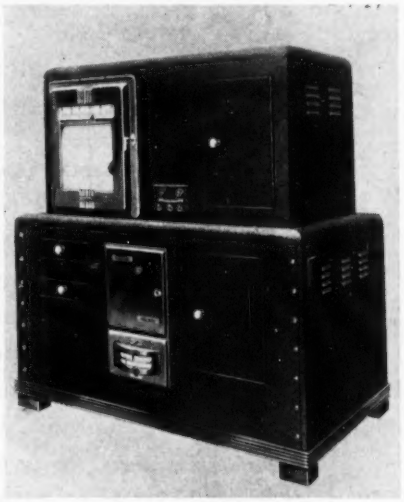
Type 144 is recommended for a maximum load of 60 lbs., maximum deflection at that load is ⅛" and minimum disturbing frequency 1350 per min.

Dilatometer QC 955

An improved automatic dilatometer for continuous recording of the thermal expansion and contraction of a wide range of materials has been announced by the Electronics Division, Sylvania Electric Products, Inc.

The equipment is designed to provide continuous graphic recording of the twelve-hour expansion and contraction cycles of samples. The instrument provides a high degree of both sensitivity and accuracy and records automatically without the supervision of a laboratory assistant. Measurements begun during the afternoon of one day may be automatically completed overnight.

In addition to eliminating the tedious plotting of instant values by older methods the recording densitometer permits



determination of true variations in length even when samples exhibit exceptions to the rule of elongation as a function of temperature. This makes the equipment particularly useful in connection with the laboratory study of ferrous alloys at thermal critical points.

The dilatometer includes a furnace a sub-zero cooling chamber; furnace thermocouple; concentric quartz tube; specimen thermocouple; gearbox and support; transmission; contact mechanism; electronic relay; and recorder. Each one of these principal units performs a separate function but all functions are closely coordinated to hold specimen temperature uniform within 1°C.; provide uniform

CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

CHEMICAL INDUSTRIES, 522 Fifth Ave., New York 18, N. Y. (10-6)
Please send me more detailed information on the following new equipment

QC 952	QC 957	QC 962	QC 967	QC 971	QC 975
QC 953	QC 958	QC 963	QC 968	QC 972	QC 976
QC 954	QC 959	QC 964	QC 969	QC 973	QC 977
QC 955	QC 960	QC 965	QC 970	QC 974	QC 978
QC 956	QC 961	QC 966			QC 979
					QC 980

Name .....

Company .....

Street .....

City & State .....

ON NEW EQUIPMENT SPECIFICATIONS
ADD THE PROTECTIVE PHRASE

"OUTSIDE TO BE TYGON-COATED"

The tank shown above is lined on the inside with a 3/32" thick Tygon sheet lining. Exterior coated with three coats of Tygon Paint.

Don't take a chance on avoiding heavy maintenance and repair costs caused by corrosion. *Be sure.* Specify —"outside to be Tygon-coated."

Tygon Plastic Paint Coatings have been proved by years of exposure to such corrosives as sulphuric, hydrofluoric, nitric, hydrochloric, sodium hypochlorite, potassium hydroxide (in fact, Tygon Plastic Paint Coatings will resist the fumes of virtually all acids and alkalies except glacial acetic and fuming nitric).

Tygon Paint is inert to most alcohols, to fresh or salt water, to oil and grease . . . stands up under abuse that quickly kills ordinary coatings.

There are other things about Tygon Paint Coatings you'll like: no cracking, checking or crazing; a really *flexible* film that "gives" under impact without chipping or flaking; high electrical insulating properties; a film that is non-toxic, non-contaminating and non-flammable.

Tygon Plastic Paint Coatings are available in colors, too: white, red, gray, green, aluminum, black and clear.

ANTI-CORROSIVE MAINTENANCE
in your own plant . . .

Your own maintenance crew can easily use Tygon Plastic Paint Coatings to protect walls, structural steel, tank exteriors, fume hoods and ducts, etc. Apply by spray gun or brush—air dries quickly. Use on wood, metal or concrete. Would you like a free test sample? *Write today*

PLASTICS & SYNTHETICS DIVISION

U. S. STONEWARE

Akron 9, Ohio

heating and cooling with the specimen in an inert atmosphere; automatic shut-off; and an overall accuracy of 0.2%.

Accommodating three, four or five inch specimens the dilatometer will accommodate temperatures up to 1000° C.; weighs 450 pounds; and measures 56° wide, 50" high and 26" deep. It is designed for use at 110-120 volts, 50-60 cycle supply and is rated at 900-1000 watts. It is covered by U. S. P. 2,351,572.

Resistance-Capacitance Bridge QC 956

The new Aerovox Model 76 resistance-capacitance bridge is a general-utility instrument, just announced by Aerovox Corp. Extreme ruggedness makes it equally suitable for use out on the job, in the shop, or at the hands of the laboratory technician.

The high accuracy of this bridge is due to its main 4" dia. dial with the same calibrated and linear scale for all functions. The absence of crowding at the high end provides easier and more accurate readings. Both resistance and capacitance readings are covered by six overlapping ranges as against two or three in usual service instruments, for maximum sensitivity and accuracy. The "magic eye" null indicator provides the positive, snappy indication of balance.

The Model 76 Bridge (1) measures capacitance from 100 mmf. to 200 mfd. in six ranges, (2) measures resistance from 10 ohms to 200 megohms in six ranges, (3) measures power factor from 0 to 50%, (4) provides DC polarizing potential for leakage measurements, from 0-600 volts DC, continuously variable and calibrated in volts, (5) checks leakage of electrolytic capacitors, or insulation resistance of mica or paper capacitors. The instrument is provided with shock-proof color-coded test leads fitted with banana plugs for the panel jacks, and with clips at the other end.

Speed Selector QC 957

A new development of planetary motion in which two standard cross-section V-belts and four variable pitch pulleys provide infinite ratio, stepless speed from full down through zero and into full reverse at constant torque of two-horsepower capacity is jointly announced by Speed Selector, Inc., and The B. F. Goodrich Co.

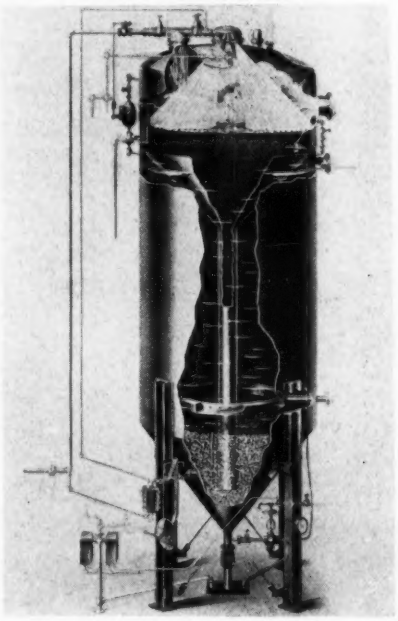
A slight change in the variable pitch pulleys of the Speed Selector brings a large change in output speed through the multiplying action of the planetary mounted on the motor or driven shaft of the machine on which it is used, eliminating need for special mounting brackets, or extra guards.

In operation the Variable-V-Planetary Speed Selector system compares the ratios of two V-belt drives and applies the difference in speed to output shafts. With the ratios equal, the difference in speed and output shaft speed is zero. If the ratio of one drive is greater than the other the output shaft rotates forward at a speed proportionate to the difference in ratios. If the ratio is less the output shaft operates in reverse in the same proportionate ratios. Speeds from 400 r.p.m. to zero, forward and reverse can be obtained.

All changes are made by a hand control wheel, which alters the pitch diameter of the center pulleys so that as one is increased the other is decreased and the change imparted to the outer pulleys by the wedging action of the V-belts. It is mounted on the input shaft of the driven machine by a tapered collet. The wheel thus controls diameter of all four pulleys without use of springs or complex linkages.

Hot Process Water Softener QC 959

Improved boiler feed water and substantial savings in chemicals required for water softening are two chief features of a new type of hot process water softener, incorporating a sludge blanket design,



which has been developed by The Permutit Co. This new equipment, built in four models, also reduces the turbidity of softened water, lessens the load on filters, reduces the amount of backwashing and lowers the amount of silica left in the water.

In the tank, suspended sludge forms a bed which acts as a filter screen for fine particles. This bed, coupled with the slow rate of upward flow throughout the full cross section of the settling tank, gives a less turbid effluent than older types of softeners. The low turbidity in the settled water places a relatively light load on filters and this in turn produces a corresponding reduction in frequency of backwashing.

Where water is softened in two stages, low turbidity is important in the effluent of the first stage because much of the turbidity or suspended calcium carbonate consumes phosphate in the second stage. High turbidity, therefore, increases the consumption of phosphate, the most expensive reagent used in water softening.

In addition, the sludge blanket reduces the amount of lime required to soften

Truck Unloader QC 958

Virtually complete automatic loading of box cars is possible with the newly developed unloader for Towmotor lift trucks made by Towmotor Corp. The unloader, as shown here, is operated by the driver from his regular position. Tests made to date show that loading costs can be cut as much as 50 per cent with adoption of the unloader, offered for all Towmotor models.

EVERY KIDDE PORTABLE NOW HAS *Trigger-Finger Control!*

—and every one has these outstanding advantages

1. Fast in action.
2. Simple to use . . . just aim at the fire, pull the trigger.
3. Deadly to fires in flammable liquids and electrical equipment.
4. Harmless to materials and equipment. Cannot contaminate liquids, or corrode metals. Leaves no after-fire mess behind.

Trigger-controlled Kidde Portable Extinguishers have carbon dioxide capacities from 2½ to 20 pounds. Get the facts today!

Walter Kidde & Company, Inc., 1027 Main Street, Belleville 9, New Jersey

Kidde

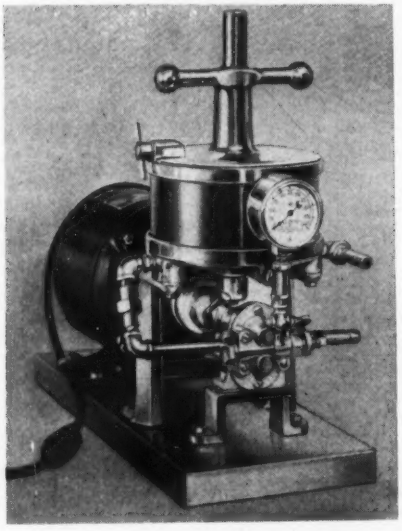
The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

Kidde

water, since unconsumed lime is retained in the blanket until it reacts with water hardness. In older, conventional types of hot process softeners, the unconsumed lime is often wastefully removed during blow-offs with the sludge that has settled on the bottom of the tank. When the sludge blanket has considerable magnesia, a higher degree of silica removal is effected.

Bench Type Filter QC 960

The Alsop Engineering Corp. announces a new Bench type filter. It was especially designed for light manufacturing or pilot plant work, and is of the "Sealed-Disc" type using asbestos discs



which can be supplied in eight different grades for coarse or ultra-fine filtration.

The filter is completely enclosed, preventing loss of liquid by dripping or evaporation, and so designed that when the handle on top is removed the entire filter can be taken apart for easy cleaning.

The model shown which has a positive pressure rotary pump is made with capacities from one to six g.p.m. and with filtration areas of from 40 to 1200 square inches.

When liquid contains abrasives, carbon, filter aids, or acids, an Alsop Centripoise pump can be used and all parts touching liquid can be made of corrosion or abrasion resistant material.

Fire Extinguisher QC 961

A new type of fire extinguishing unit for a wide range of outdoor industrial fire hazards has been introduced by Cardox Corp. The new unit has a capacity of 750 lbs. liquid carbon dioxide and 32 gals. of mechanical foam solution. Its two specially engineered, long range carbon dioxide nozzles, each with 100′ of ⅞″ hose, have a combined discharge rate of 400 lbs. of carbon dioxide per minute. A foam gun, on a 100′, ⅝″ hose line has a discharge rate of 18 gals. per minute, with pressure supplied by the carbon dioxide. The two extinguishing agents supplement one another.

The unit is a compact four-wheel trailer, using standard automobile wheels and front axle assembly and 6:00 x 16 tires. With a wheelbase of 52″, front and rear tread widths of 58″ and 60″ respectively and an overall height of 5′, 4″, it exhibits exceptional stability even at high speed. A standard automotive towing bar enables quick connection to automobile, jeep or tractor. Step plates on sides and rear accommodate three firemen. Tool compartments provide space for equipment and tools needed in fire fighting operations.

Low pressure liquid carbon dioxide is stored in the trailer in a single insulated, refrigerated pressure vessel at a controlled temperature of approximately 0° F. and 300 psi. At this temperature the liquid carbon dioxide yields 47% CO_2 "snow" when released. By concentrating the CO_2 snow in one portion of the discharge, the snow's dense mass can be directed into the heart of the fire through relatively great distances in the presence of strong outdoor air currents.

Under conditions closely simulating actual industrial fires, this unit has successfully extinguished fires involving approximately 200 gallons of gasoline burning over a wide area on two or more levels.

Tachometer QC 962

A new electric tachometer for permanent installation is announced by Ideal Industries, Inc. The generator consists of a small, permanent "Alnico" magnet rotor mounted on precision sealed ball bearings and capable of continuous operation at speeds within the limit of the meter.

The meter or indicating instrument is a rectifier type, including a sturdy D'Arsonval movement. It is capable of withstanding a momentary overload up to four times the maximum speed indication without damage.

The meters are rectangular in shape and available in two sizes: 3″ and 7″. Both are available in three scale sizes: 0-1250 rpm., 0-2500 rpm. and 0-5000 rpm.

Oil Heater QC 963

To meet the demand for low pressure heat transfer system for cylinder jackets and dies of plastic extruders, processing kettles and similar jacketed equipment, The Youngstown Miller Co., subsidiary of Walter Kidde & Company, Inc., announces a new line of jacket oil heaters.

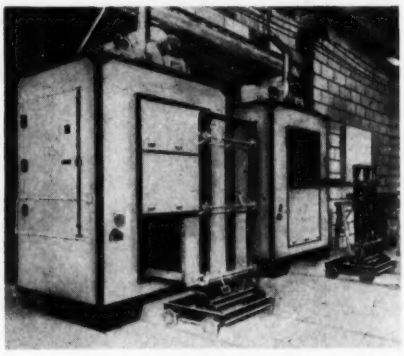
Four standard sizes ranging from 14 to 65 KW are available and special units to supply any volume of heat at temperatures up to 550° F. can be furnished. Each self-contained unit offers the following advantages: one, two, three or more temperatures simultaneously; wide temperature range; accurate temperature controls; 5 to 150 KW of heat or more if required; temperatures variable through manual selection; stationary or portable models.

The units occupy little floor space, requiring only a power line connection and a small amount of external piping. Both the installation and operating costs compare favorably with those of steam, vapor or pressure systems of any kind. Insulation cuts heat losses to a minimum.

Heat is supplied by finned tube heaters through which heat transfer oil is pumped at a rate consistent with the conditions of service. Since the heaters are not in contact with the oil, there is no fire hazard.

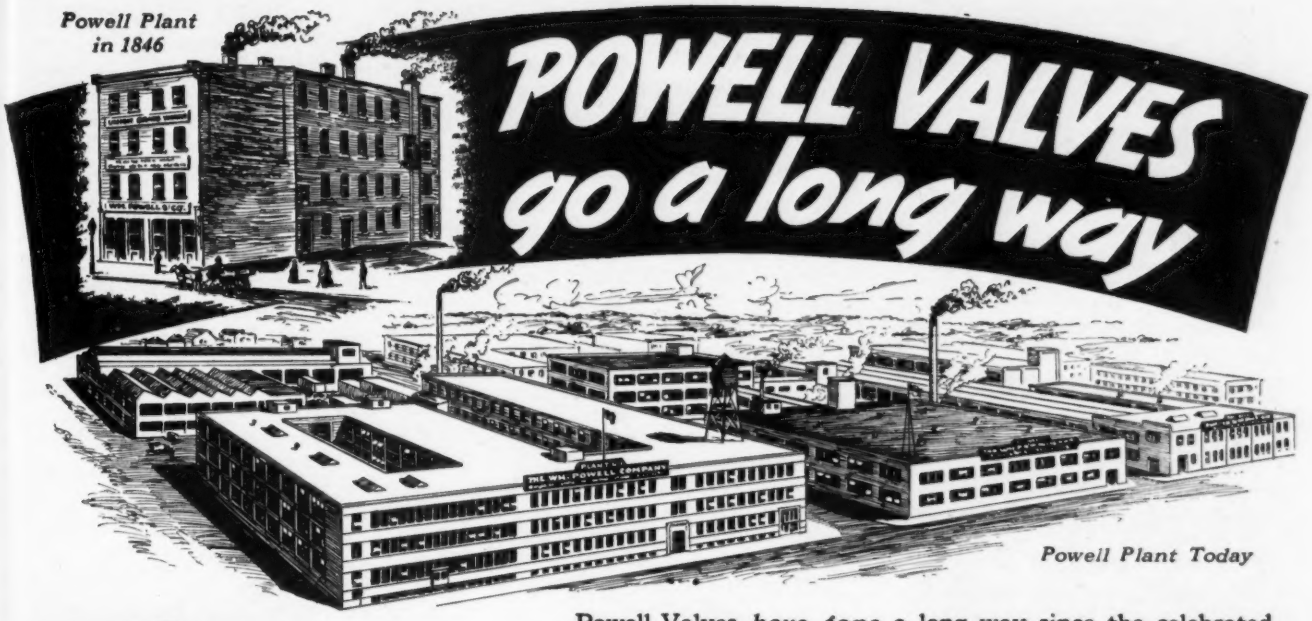
Pull-Drawer Oven QC 964

A new type of pull-drawer oven has been developed by Gehnrich Oven Division, W. S. Rockwell Co., which offers all the advantages of drawer type ovens for processing batches of work per drawer, yet eliminates certain inherent disadvantages. The new oven has been arranged so that all the superstructure is eliminated, the drawers being supported on a puller mechanism set on a simple channel iron base frame riding on ball bearing wheels in a track guide on the plant floor. The puller engages any one or all of the drawers and is easily pulled or pushed by one man. When all drawers



are inside the open the puller base projects no more than 15″ in front of the bottom of the oven. Thus fans, heaters and motors may be set directly on the oven roof, reducing overall equipment height.

The oven itself is of Gehnrich Insulated Dual Panel no through-metal construction throughout, suitably reinforced in a steel framework. In this particular installation heat is supplied by electric heaters nested at one side and baffled from the heating chamber. A door at that side permits ready access for inspection and service. Where gas, oil or steam heating is desired, an air heater may be installed on the oven roof, or gas or oil burners may fire into a combustion chamber at one side of the oven. Heat is drawn from the heater (or combustion chamber) through a recirculating fan on the roof, discharging into a slotted supply duct at the other side wall and blowing horizontally across the work,



Powell Valves *have gone* a long way since the celebrated Powell "Star" Regrinding Globe Valve was patented in 1865.

Today, with a notably complete line of valves, which includes every required type, size and design—in bronze, iron, steel and many corrosion-resistant metals and special alloys—Powell Valves *are going* a long way in meeting the flow control requirements of modern industry.

Above all, Powell Valves *go* a long way in actual service, because each valve is designed to give maximum performance under the actual operating conditions it will encounter.

Catalogs on request. Kindly state whether you are chiefly interested in Bronze, Iron, Cast Steel, or Corrosion-Resistant Valves.

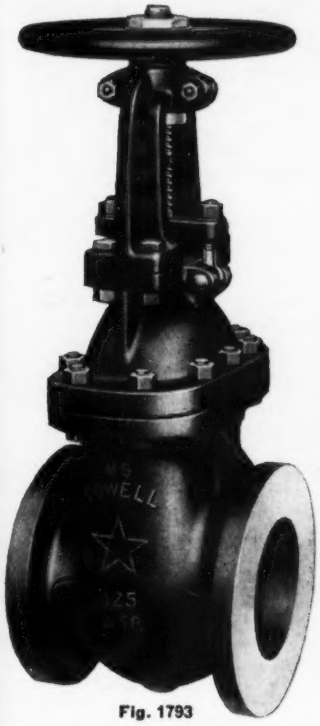


Fig. 1793

Large Iron Body Bronze Mounted Gate Valve for 125 pounds W. S. P. Made in sizes 2" to 30", incl. Has flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc. Taper wedge double discs can be provided in sizes 2" to 12" incl. Seat rings and stem are bronze. Disc is bronze in 3½" and smaller size valves and bronze faced in the larger sizes. Also available in All Iron for process lines.

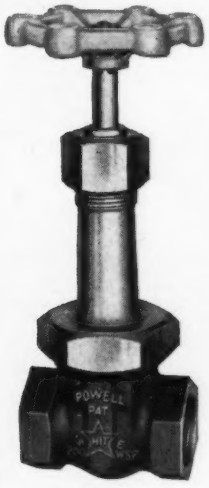


Fig. 375

200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet, renewable, wear-resisting "Powellium" nickel-bronze disc.

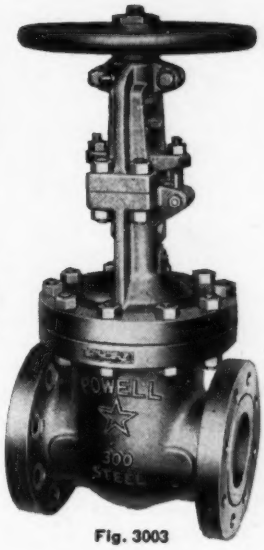


Fig. 3003

Class 300-pound Cast Steel Gate Valve. Has flanged ends, outside screw rising stem, bolted flanged yoke and taper wedge solid disc.

Powell Cast Steel Valves of all types are available in pressure classes from 150 to 2500 pounds, inclusive.

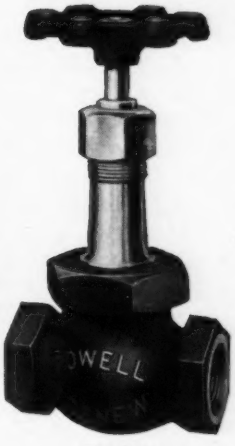


Fig. 190

150-pound Iron Body Bronze Mounted "Irenew" Globe Valve. Has screwed ends, union bonnet, regrindable, renewable wear-resisting "Powellium" seat and disc. Also available in All Iron for process lines.

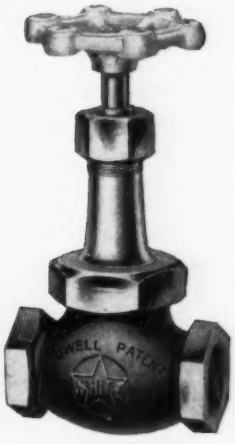


Fig. 1708

200-pound Bronze Globe Valve. Has screwed ends, union bonnet, renewable, specially heat-treated stainless steel seat and regrindable, renewable, wear-resisting "Powellium" nickel-bronze, plug type disc.

The Wm. Powell Co., Cincinnati 22, Ohio

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POWELL VALVES

returning through the heater in a rapid, constantly recirculating motion. An exhaust fan on the roof is supplied where required, for purging the oven of undesirable vapors.

Welding Goggle QC 965

A new head-rest welding goggle which can be instantly thrown into "off guard" position for rapid inspection of setups is announced by American Optical Co.

Developed to eliminate waste motion and speed up welding operations, the goggle is attached by a friction joint to a comfortable head gear assembly. Using

only one hand, the welder can flip the goggle above his eyes, where it is held securely by the friction joint, so that he has complete, unimpeded vision.

Adjustable for individual features, the goggle is equipped with opaque eyecups specially designed for wearing directly over the eyes or over personal prescription glasses. It also has indirect, ventilated side shields which keep out stray light rays, sparks and metal splashes, yet provide ventilation to reduce fogging.

The goggle is available with either Noviweld or Noviweld-Didymium lenses in certain shades.

AC Generator QC 966

The Kato Engineering Co., recently added a new series to its line of AC generators. It is made in 8 and 10 poles, making it especially desirable for direct connection to 720 rpm and 900 rpm engines. The alternator can be furnished either with two bearings, or single bearing to permit direct carriage of drive end of alternator on engine-driven shaft.

900 rpm generators are available with direct connected exciter or top mounted exciter. 720 rpm generators are available only with top mounted V belt-driven exciter. All exciters are of the shunt-wound type and can be furnished at either 125 or 250 volts DC. They have an extra large commutator and multiple brush holder, and are also equipped with commutating field poles. The exciter generator is also furnished with cartridge ball bearings.

Generators are available in 2 wire and 3 wire, single phase, and 3 and 4 wire, 3 phase for voltage combinations, such as 110-220 volts for single phase and 208-120 volts, 3 phase; or 3 phase, 440 volts.

Stainless Steel Valves QC 967

Crane Co. has announced reinstatement of its line of 18-8 Mo alloy steel corrosion-resistant valves and fittings, regular manufacture of which was discontinued during the war. The Crane 18-8 line, as reinstated, includes globe, gate, check, and relief valves in both screwed and flanged patterns, liquid level gauges, and screwed and flanged fittings. Sizes in screwed end patterns are ¼ to 2 inches, and in flanged end patterns are 1 to 4 inches.

Grinding Mill QC 968

The new SB1400 Morehouse Hy-R-Speed mill, designed for a wide range of grinding uses with more than a gallon-a-minute capacity, is now available. It

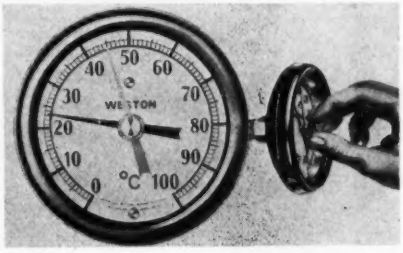
has interchangeable parts, dual bearing mounts, and a 6-Spline coupling to its 20 hp. motor. Measuring only 5′ x 18″, the SB1400 has greater cooling capacity and a more efficient fume collection system than previous models. It can be used on a wide variety of substances and is adjustable while the mill is in use. It is easy to clean and extremely easy to disassemble and reassemble.

Combination Starters QC 969

Electric Machinery Mfg. Co. announces a new line of "Hi-Fuse" polarized field frequency synchronous motor controls with current-limiting fuses. These general-purpose, high-voltage combination starters are suitable for general installation in industrial plants with high voltage service, and are usually applicable without necessity of engineering analysis of short circuit currents, yet provide interrupting capacity generally adequate for all except the largest distribution systems. The "Hi-Fuse" control is a logical complement to the low-voltage combination synchronous motor starters which are universally used, providing (1) disconnecting means, (2) short-circuit protection, and (3) motor over-load protection. Furnished in voltage ratings up to 5,000 volts, with a current interrupting capacity of 60,000 amperes asymmetrical.

All Metal Thermometer QC 970

A new all-metal thermometer known as the Max-Min, which indicates the maximum or minimum temperatures



reached, has been introduced by the Weston Electrical Instrument Corp.

Similar in other respects to the standard Weston all-metal thermometer, the new Max-Min, has an auxiliary red index which is manually set by a finger knob which protrudes from the center of the scale glass (as illustrated).

When a record of the lowest temperature reached is desired, this index is placed to the low side of the temperature pointer. The pointer will move the index to the lowest temperature reached during any operating period, and the index will remain at that low point until manually re-set. For a record of the highest temperature reached, the index is simply set at the high side of the pointer.

This new Max-Min carries the same accuracy guarantee as the standard Weston thermometers. It is now available in two models, 221M and 222M, with scale diameters of three and five inches respectively. It is also available in all the usual Weston ranges, and in stem lengths from two and one-half to 48 inches.

Etcher for Production Marking QC 971

The Ideal E-Z Mark Etcher, a new device for production marking, is announced by Ideal Industries, Inc. Through use of a film stencil, it will reproduce counterparts of a stencil pattern in one to three seconds on steel, brass, copper, bronze, tin, and many other metals. It is efficient for tools or plates having round as well as flat surfaces. Impressions on the film stencil may be made by

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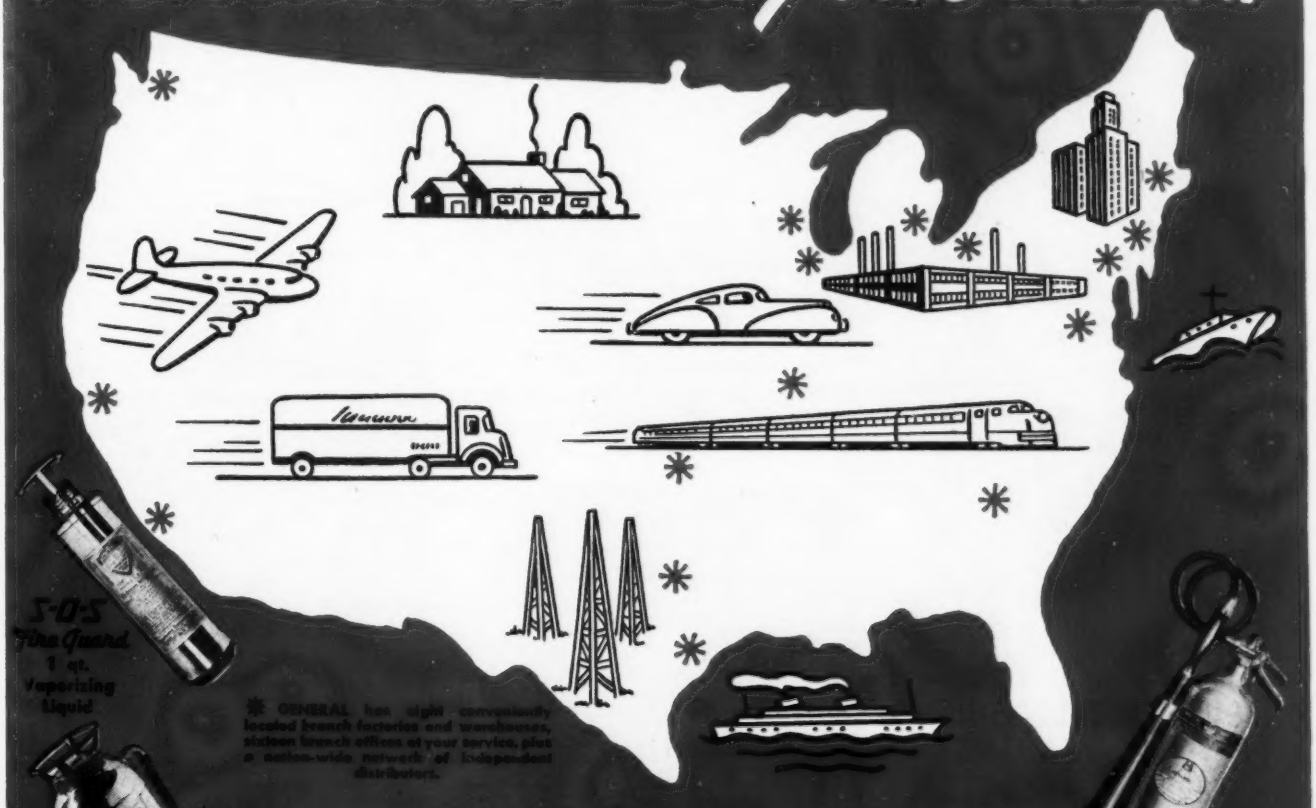

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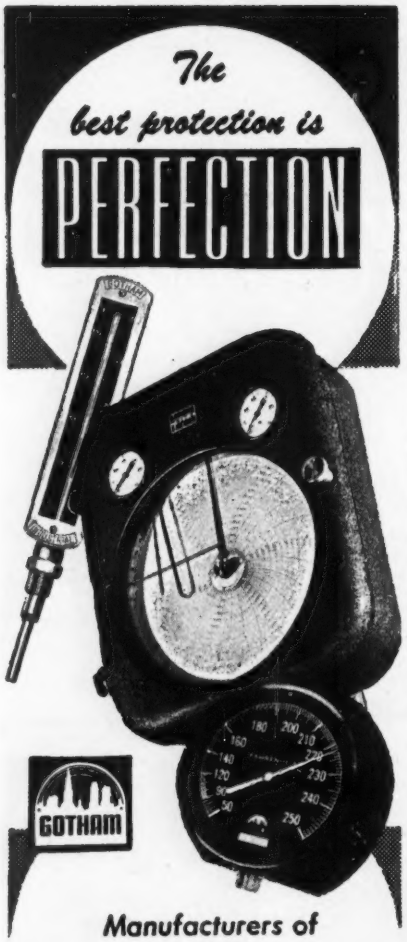


typewriter, pen, pencil, or stylus, and the number of reproductions from a single film can run to several hundred.

The etching fluid is a non-acidic compound, harmless upon contact with the hand or body.

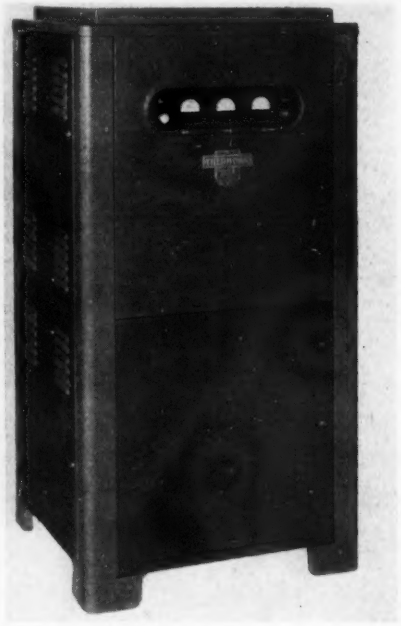
The depth of markings is controlled by a rheostat and time of etching exposure.

The Ideal E-Z Mark etcher is compact: 9" x 11" x 7¾" high. Rated at 15 v. amps., 115 v. AC, 50-60 cy. Weight, 17 lbs. Comes complete with sponges, cloth pads, etching fluid, protective fluid and 24 films.

Dielectric Heater QC 972

The Ther-Monic M-285C electronic heater, suitable for both induction (metal) and dielectric (non-metal) heating operations, is one of the recent developments of the Induction Heating Corp.

This combination induction and dielectric heating generator is provided with two interchangeable oscillator sections,



one for induction and the other for dielectric heating. Changeover from one oscillator section to the other is accomplished by removing one oscillator section and replacing it with the other. The induction oscillator feeds into a radio-frequency output transformer, while the dielectric oscillator feeds through coaxial cables to heating electrodes.

The unit is a high-frequency generator, operating on 205-245 volts, 60-cycle, single-phase power supply, and having a full-load input of 12KVA. at 90% power factor. Its full-load output is 285 B.T.U. per minute or approximately 5 KW. at nominal frequencies of 375,000 cycles per second for induction heating and 20,000,000 cycles per second for dielectric heating operation. The tube complement of this unit comprises two mercury-vapor rectifiers and one water-cooled oscillator.

The generator weighs 1400 pounds, is 36 in. wide, 28 in. deep and 62⅛ in. high.

Electronic Timer QC 973

General Control announces a new electronic timer, the Promatic, featuring highly accurate control of industrial processes under virtually any condition of temperature and humidity.

Promatic timers allow either full automatic or semi-automatic control of the equipment to which they are connected. Two or more timers may be used to control a number of individually timed operations in a predetermined sequence—with either self-recycling or manual recycling.

Control of the timing period is by means of a plug-in type condenser unit and

a variable resistor. The resistor control has a graduated dial. One condenser unit is supplied with each timer to obtain the timing period specified.

Five timing periods are available, in ranges of ½ sec. to 1.2 secs., ½ sec. to 8 secs., ¾ sec. to 15 secs., 1.5 secs. to 30 secs., and 3 secs. to 60 secs. The Promatic timer is available in both 110- and 220-volt types, 60 cycles, A. C.—with relay contacts rated at 10 amperes. Timers for operation on D. C. are also available, on special order.

With minor changes at the factory, Promatic timers can be adapted for use on numerous *non-timing* applications—such as forward-acting photo-electric cell relays, reverse-acting photo-electric cell rays, and for use as a very sensitive relay. The unit weighs 2½ pounds.

O_2 Indicator QC 974

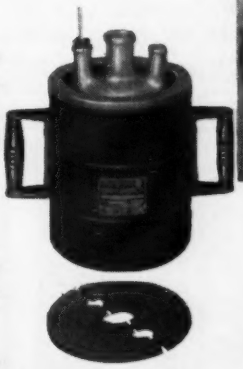
The M. S. A. Oxygen Indicator Type C, for measuring the oxygen content of gaseous mixtures in chemical, metallurgical, petroleum, and allied industries for combustion and process control is the newest precision gas-detecting and measuring instrument made by Mine Safety Appliances Co.

"PRECISION" Safety Heaters

Specifically designed for the difficult job of heating complex glassware columns, delicate reflux condensers and other glassware. Important features include freedom from fire hazards, conservation of samples, easy handling, quick responsive heating.

FEATURES

Hemispherical seamless steel bowl shaped to fit flask. Heating elements fully enclosed. Gear rack elevating support available for unusually heavy or complex setups allows elevating and lowering of Safety Heater without disturbing glassware setup. Special transite covers when required. Available in six sizes, ½, 1, 2, 3, 5 and 12 liter capacity.



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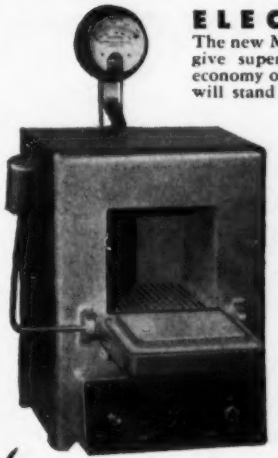
NEW TEMCO MODEL CEA



ELECTRIC FURNACE

The new MODEL C E A has been designed to give superior performance, with ease and economy of operation, at a low initial cost. It will stand hard use and is an ideal furnace for general laboratory purposes, heat-treating and small unit production.

SPECIFICATIONS

Temperature Control — Any temperature from 500° F. to 2000° F. can be selected and automatically maintained with TEMCO variable temperature control.

Pyrometer — Indicating type calibrated in both Fahrenheit and Centigrade scales.

Dimensions—Inside 4¾" wide, 4¼" high, 6" deep. Outside 12" wide, 15½" high, 14½" deep.

Prices Model CEA Complete
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- Heats up to 1500° F. in 30 minutes.
- Can be operated continuously up to 2000° F.
- Embedded heating element protected against damage and chemical deterioration. Muffle core easily replaceable.
- Heating element, special high temperature alloy, completely surrounds heating chamber assuring the most uniform distribution of heat.
- Insulated with highly efficient, light-weight materials cast permanently into furnace body.

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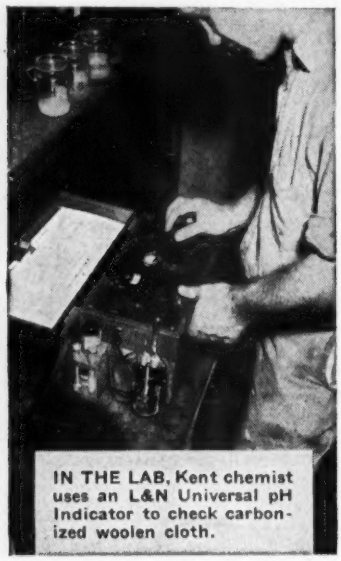
THERMO ELECTRIC MFG. CO. 463 W. Locust St., Dubuque, Ia.

The most important single element of the M. S. A. Oxygen Indicator is its electrolytic detector cell. This is made up of a plastic container with a hollow carbon tube and metallic plate serving as electrodes in approximately an ounce of liquid electrolyte. Polarization in the cell causes hydrogen to be deposited on the carbon pole. When a gas sample containing oxygen is passed through the hollow carbon electrode, diffusion through the porous carbon causes the oxygen to combine with the "electrolytic hydrogen" reducing the internal resistance of the cell and causing its current and voltage output to be increased. A direct reading meter, having a linear scale indicates the percentage of oxygen in the sample.

The M. S. A. Oxygen Indicator is available in any of the following standard, full scale ranges—0 to 0.5%, 0 to 5%, 0 to 10%, and 0 to 25%, thereby providing the greatest possible usefulness in all applications. The large size integral concentration meter can be read directly to 2% of full scale range. An adjustable high point contacting device, provided in each M. S. A. Oxygen Indicator Type C, can be used for automatic activation of warning signals or control circuits whenever oxygen concentration exceeds a predetermined limit.

The Indicator requires a sample flow of only 25 to 75 cc. per minute. Under constant pressures of less than 12 inches of water, an external motor-driven pump is utilized to push the sample through the instrument. At higher constant pressures the gas readily flows unassisted. Both calibration and zero-adjusting circuits, independent of each other, are provided. Provision is also made for attachment of an electronic recorder or galvanometer potentiometer recorder to produce a permanent and graphic record of oxygen concentrations.

IN THE PLANT of the Kent Mfg. Co. woolen mill, Clifton Heights, Pa., pH of indigo dye is measured with an L&N Glass-Electrode pH Indicator.



IN THE LAB, Kent chemist uses an L&N Universal pH Indicator to check carbonized woolen cloth.

pH INDICATORS FOR "EVERYBODY"
. . . IN LAB OR PLANT

The pH measuring problems of the lab and of the manufacturing process are efficiently solved by two related but distinctly different L&N Portable Indicators.

The lab chemist, familiar with pH theory, chooses the Universal pH Indicator, and secures high accuracy and sensitivity in a speedy and convenient instrument. Using this precise, general-purpose Indicator, he can measure pH with any electrode, can titrate, and can measure oxidation-reduction potentials.

The process operator, knowing nothing of pH theory but needing a dependable instrument for rapid routine tests, is given an L&N Glass-Electrode Indicator. By its accurate, on-the-spot checks, he can hold specs easily. He has no trouble using the instrument . . . to measure or titrate, he simply pours a sample into the beaker and reads pH directly.

For more complete information, just ask for Catalog E-96(3), Universal Indicator, and E-96(2), Glass-Electrode Indicator.

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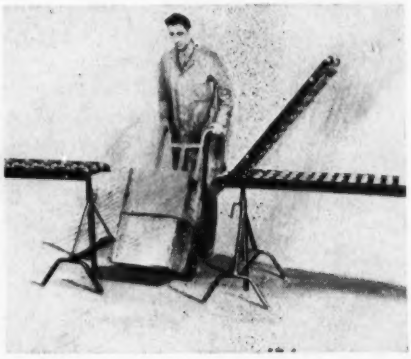
Hinged Conveyor Section QC 975

A hinged section for use in a permannent line of the standard Rapid-Wheel



gravity conveyor is being produced by the Rapids-Standard Co.

The specially-designed section finds principal use in bridging an aisle-way by providing 36 inches maximum open passage-way through a conveyor line.

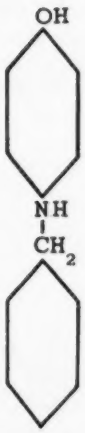
The hinged section is opened simply by lifting the movable part, swinging it upwards and back until it rests securely on the stationary section. Thus the movable part folds back completely out of the way and rests at an angle of approximately 45 degrees to the stationary section.

All parts of the Hinged Section are of standard Rapid-Wheel construction, consisting of 36 inches of movable section hinged to an 84-inch long stationary section, making a total of 10 feet, the same length as a standard 10-foot section of Rapid-Wheel Conveyor.

CO_2 Recorder QC 976

A new instrument just announced by Davis Emergency Equipment Co. has several unusual features, among which is extreme sensitivity to variations in the percentage of CO_2 in the flue gas, enabling the instrument to record a change within 3½ seconds after the variation in CO_2 content of the flue gas has reached the analyzing cell.

Employing the well-known principle of thermal conductivity analysis, new developments in cell construction permit the elimination of continuously operating suction pumps. Unlike any other analyzer available today, the flow rate through the gas sampling line does not exceed 250cc per minute; the minimum flow required is 20cc per minute. This low rate of flow eliminates the need for extensive



Multi-Purpose Organic Compound

BENZYL-p-AMINOPHENOL (base and hydrochloride) is frequently useful as an intermediate in organic synthesis and in the manufacture of dyes. It also serves well as a polymerization inhibitor, and as an antioxidant for gasoline, oils, and rubber. Available in the technical grade. Eastman Kodak Company, Rochester 4, N. Y.

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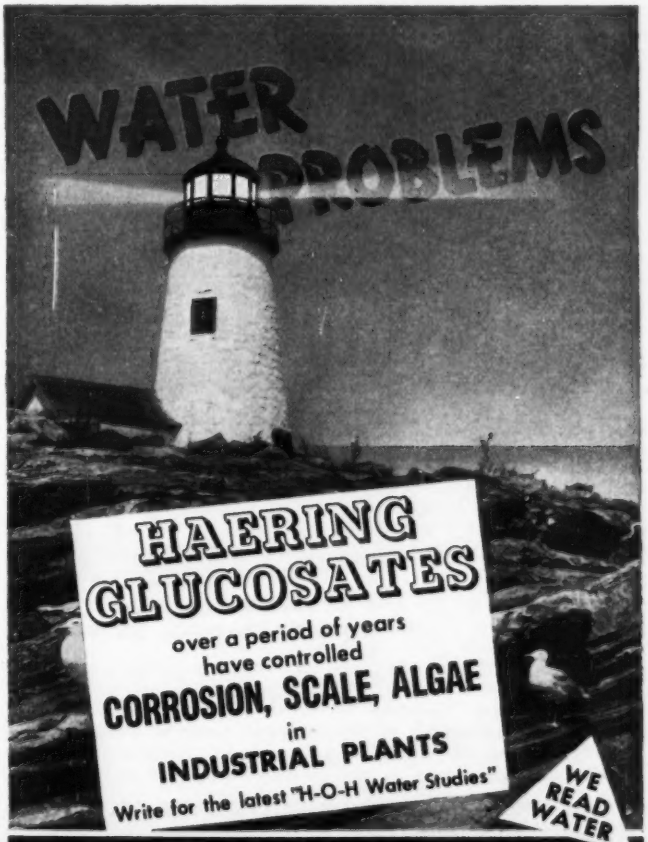

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filtering trains and the necessity of employing dryers.

The pressure differential between the last pass of the boiler and the stack side of the barometric damper is all that is necessary to assure a constant free flow of gas through the analyzer cell at the desired rate.

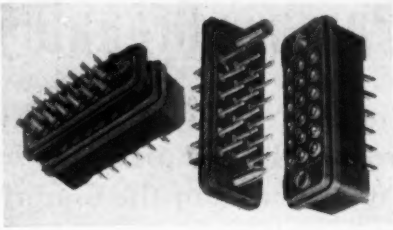
To continuously record changes in CO_2 determined by the analyzing cell in this new Davis-Hebler instrument, a Brown Continuous Balance Electronik Recorder is used. Recorder is furnished with 24-hour circular charts. Range of chart is 0 to 20% CO_2.

The Cell Panel is a complete unit housing all necessary piping and parts and is mounted adjacent to the stack at the sampling point. Control Cabinet and Recorder are panel mounted at any location convenient for observation. Source of D. C. current for operation of the complete unit is provided through a constant potential rectifier, eliminating the need for storage batteries. A six-conductor cable is provided to connect the cell panel and recorder and control cabinet panel.

Multiple Contact Connector QC 977

A new multiple contact connector, just developed by the Winchester Co., is particularly adapted to limited space applications where reliable plug-in operation is required. The rectangular monobloc connector can also be supplied with a self-contained locking device which eliminates the necessity of any external clamping arrangement.

Molded of Melmamine plastic, the one-piece inserts reduce the danger of flash-over due to moisture and dust accumula-



tions. Not only does this monoblock type construction permit easy removal of contacts, but it also makes the connector more rugged.

Two heavy guide pins, acting as ground contacts, perform the additional functions of alignment and polarization.

The multiple telescoping barriers which serve to isolate contacts increase both surface creepage and air gap between adjacent contacts. Thus the connector may be used at extremely high potentials. Minimum air gap of ¼ inch is maintained between all contacts. Contacts are designed for use with a maximum wire size of #16 AWG.

Available in two sizes . . . 18 contacts (RE18S) and 12 contacts (RE12S), this connector can also be supplied fitted with conventional straight type contacts, (RE18 and (RE12).

Rotameter Tube QC 978

Three equally spaced ribs formed right in the inner-bore of the tapered, corrosion resistant, boro-silicate glass metering tube, provide a new standard of operating efficiency. The axes of these ribs are parallel to the axis of the metering tube and the rib edges are tangent to the bore of the smaller end of the tube.

The "Bead-Guide," manufactured by Fischer and Porter Co., eliminates the necessity for the guide wire or guide rod formerly used. The old guide wire construction presented numerous difficulties. The hard, clean smooth glass surface reduces guiding friction to the vanishing point.

Reading the float position when an opaque fluid is being metered is now possible without attaching the old-fashioned "reading extension" since the clearance between the "Bead-Guide" and the metering float edge is only a few thousandths of an inch. Corrosive liquids, whether opaque or transparent, are handled with ease since the float material can be selected without having to consider guide wire materials.

Conventional tubes now in use in your Rotameters can be replaced with "Bead-Guide" tubes and floats.

Intercom Unit QC 979

Numerous war born electronic developments have been incorporated in the new Model 1100 executive intercom station of

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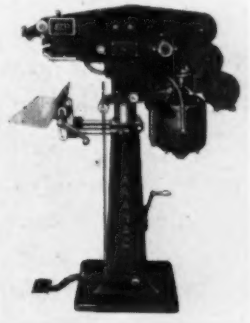
when sealed on the D-10"

Paper bags can be securely, economically, almost hermetically sealed on the Model D-10" Standard Bag Sealer. Folding and stapling operations are automatically performed at a single stroke. The resultant stapled fold is the strongest part of the bag—and it's siftproof.
Bulletin 154-C86 contains detailed information about bag sealing machines and about our inexpensive licensing plan.



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BENTON HARBOR, MICHIGAN

DRUMS

● **Full removable head containers.**

Where added strength and security are needed use our "Bolted Ring Seal" drum supplied in sizes from 10 to 70 gallons. Suitable for solids and semi-liquids. Consult us freely on your packaging problems. ●

a complete line of light gauge containers

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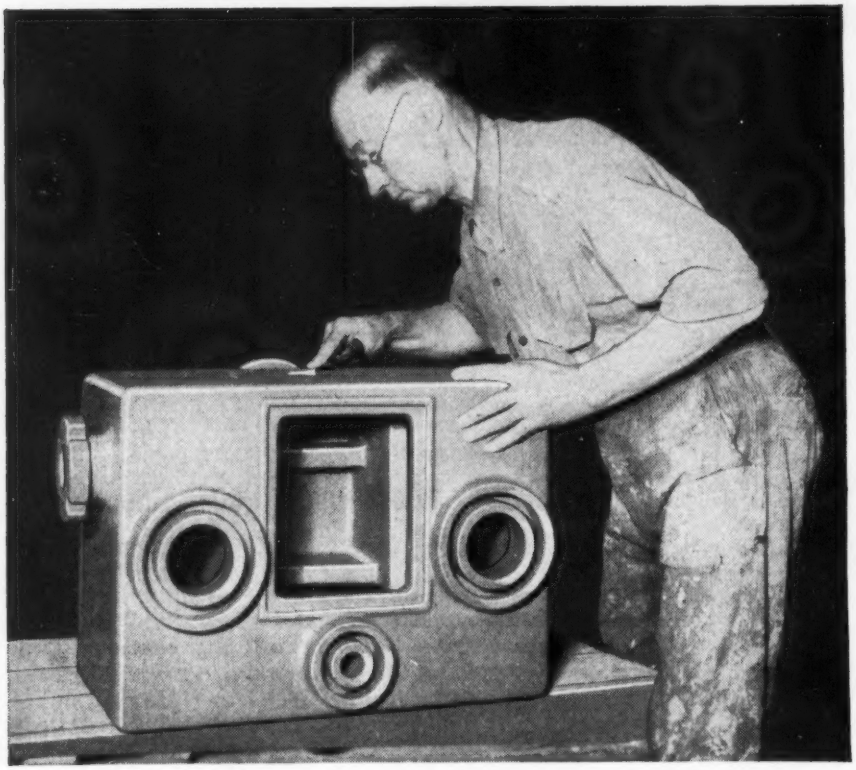
BOUND BROOK — NEW JERSEY

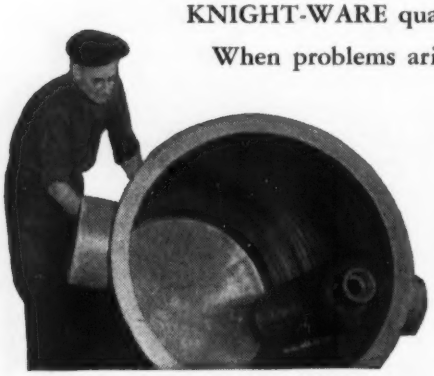


Craftsmen in Clay!

Special designs in acid-proof chemical stoneware require more than selected raw materials, careful forming and controlled processing. An intricately baffled box, or an unusually large tank made in one integral piece without seams or joints, takes plenty of experience and skill to form.

The craftsman's touch shows in Knight handbuilt equipment made to the customer's specifications. Forty years of first-hand experience in design, materials and processing plus the work of these "craftsmen in clay" bring you KNIGHT-WARE quality chemical equipment.

When problems arise involving the handling of acids, alkalies, gases and chemicals, the industry turns to Knight engineers and craftsmen for the most practical type of acid-proof equipment.



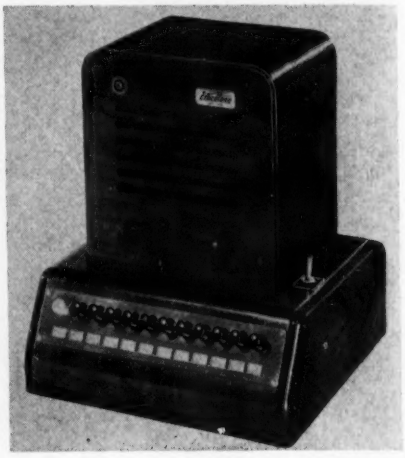
Knight-Ware Acid-Proof Sump

MAURICE A. KNIGHT
210 Kelly Ave.
Akron 9, Ohio

KNIGHT-WARE
CHEMICAL EQUIPMENT

Executone, Inc These include a new patented audio-amplifier circuit, specially designed Alnico speaker, life-time neon pilot lamp, and Vinylite insulated moisture-proof interior wiring.

Used in a system of 12 stations, this unit provides facilities for private, two-way voice communication with any combination of 11 other similar stations. Convenient push-buttons identifying each station, enable executives to originate calls selectively, without having to wait for switchboard connections. By flicking a toggle switch, an executive can receive calls and reply remotely from across the room, without approaching the unit to depress the talk key.



The users of remote or trumpet type staff stations in this system, can also reply to calls remotely without leaving their work to approach their station. An automatic light signals when the station called is busy.

Gas Regulator QC 980

The Pittsburgh Equitable Meter Division of Rockwell Manufacturing Co. has introduced a complete new series of appliance burner pressure regulators. Designated as Rockwell-Emco appliance regulators, this line is available in sizes from ⅛" through 1¼".

The bodies and covers of these regulators are pressure cast from an aluminum alloy, which is non-corrosive.

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U.S.I. CHEMICAL NEWS

October ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1946

Air Speed Record Set With Alcohol-Water-Injection

The Labor Day Thompson Trophy race—America's annual speed classic of the air—was won this year by Major "Tex" Johnston with a record speed of 373.908 miles per hour. Johnston, flying a Bell P-39 Airacobra for Skylines Unlimited, flashed his plane around the 300-mile Cleveland course, winning easily in a field of twelve starters.

The Thompson Trophy winner used alcohol-water-injection in his Allison engine, "souping up" his racer to maximum performance. Essential ingredient of the alcohol-water-injection used by Johnston is U.S.I.-manufactured "Vitol," a product employed during the war as a source of tremendous emergency power for fighter planes. Wide peacetime use in fuel-injection systems and application in other unique aviation power-plants is forecast for this specially-developed extra-power compound.

Says "Moon Blindness" Is Controlled by Riboflavin

Periodic ophthalmia, which causes temporary and frequently permanent blindness in horses has been found to be due to a deficiency of riboflavin in the diet, according to an American scientist. The disease, known as "moon blindness," can be avoided, he asserted, by adding riboflavin to the diet at the rate of 80 grams per ton of feed. This eye trouble is said to cost American horsemen more than $17,000,000 each year. Two new natural riboflavin concentrates, which also contain other members of the vitamin B complex, are now being offered by U.S.I.

To Make Sweeter Sugar

A plant is now being built to manufacture a sugar claimed to be one and one-half times sweeter than either cane sugar or beet sugar, it was announced recently. This super-sweet sugar is reported to come from the carbohydrates of the Jerusalem Artichoke, a plant native to the state of Washington.

Victims of starvation whose digestive systems can no longer handle a square meal are speeded on their way to recovery by new therapeutic uses of amino acids. Methionine is one of these amino acids.

THE MONTH IN COSMETICS

Experiments show that cold permanent wave solutions may be applied safely to unbroken human skin for as long as 24 hours . . . A new sunray protective agent is developed in Italy . . . A British scientist invents a substitute for hard vegetable waxes such as carnauba and candelilla . . . Lipstick which will not bleed, sweat or crumble even under sub-zero or humid tropical conditions is announced . . . A report on the comparative efficiency of commercial wetting agents is made . . . Myosinine is identified as the agreeable odor of cigar smoke . . . New glycerin substitutes, called alrohydrines, are now offered by an Eastern company . . . A new mechanical, dustless, and screenless pulverizer is placed on the market . . . A British scientist invents a method for the production of permanent lettering on soap.

Wider Methionine Use Seen As Result Of Low-Cost Synthesis

New U.S.I. Process Increases Availability of Vital Amino Acid

Increased availability of methionine, made possible by a new U.S.I. manufacturing process which slashes costs about 97 per cent, has spurred investigations into the development of new uses for this compound. Although supplies of methionine are still limited, much work is being performed in laboratories and clinics to extend the already wide applications of this vital amino acid. At the present time, major uses of methionine include the treatment of liver damage and toxic poisoning, and the fortification of oral and intravenous protein hydrolysates. Active interest in this compound as a means of enriching foodstuffs has also been shown.

Essential Amino Acid

Methionine is one of the ten amino acids considered essential for the growth and repair of animal tissue. In addition, it has proved successful in the therapy of liver damage, and promises great things, in combination with other amino acids, in the treatment of burns, shock, exposure, and poisoning. It has also been employed to enrich protein hydrolysates — those "predigested proteins" which have had dramatic success in the treatment of peptic ulcers and in the cure of near-fatal starvation cases.

Was Once Rare Chemical

Although some of the therapeutic applications of this compound have been known for some time, physicians could take little advantage of them, because up to the present,

(*Continued on next page*)

New Reagent Simplifies Vitamin A Determinations

The accurate estimation of Vitamin A in blood serum, fish oils, and pharmaceutical products may now become a simple routine procedure because of the availability of a new colorimetric reagent, it was announced recently. This new reagent, a derivative of glycerol dichlorhydrin, is said to develop a color with Vitamin A which is stable for at least eight minutes, permitting its absorption to be determined with extreme accuracy. In contrast, previous methods, using antimony trichloride, produce a color so transient that its absorption must be read in four seconds. This new reagent is claimed to be stable, non-toxic, and non-corrosive.

Chemistry As a Profession

What the chemist or would-be chemist may expect from his profession is the subject of a 20-page booklet published recently. The types of employment available and the training required are among the many topics discussed.

U.S.I. Is Forty Years Old

THE FIRST U.S.I. AD—In 1908, when this ad was published, U. S. Industrial Chemicals, Inc., then known as U. S. Industrial Alcohol Co., was two years old. At that time, the company was concerned primarily with the production of ethyl alcohol for industrial purposes. Since then, U.S.I. has expanded its activities into the manufacture of a wide range of other chemicals. Today, as U.S.I. celebrates its fortieth anniversary, it is producing solvents, resins, plasticizing agents, feed concentrates, and other basic chemicals which have become vital in the protective coatings, automotive, petroleum, drug, cosmetic, food, tobacco, and other industries, as well as in hospital and scientific institutions.

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Organic Coatings for Steel Containers

THE CHEMICAL industry will undoubtedly benefit from the work being undertaken by the fabricators of steel containers in connection with the development of interior coatings for steel drums. That there is a need for this program goes without saying, and its results should encourage the use of various coatings to protect the various kinds of chemicals which are shipped in steel.

T. Pat Callahan

In order to ship a material and keep it free from contamination, it is often very difficult to procure the proper type of steel container and to be certain that the interior is clean. A new steel drum, for instance, may have been exposed to moisture, creating rust and subsequent contamination of product.

Up until a few years ago, galvanized iron or tin was principally used by shippers of chemicals in order to protect the product. Prior to the war, however, certain manufacturers began supplying steel containers with interior coatings of lacquer or resin. These were developed primarily for food products, but in certain cases proved satisfactory for the shipment of chemicals. During the war severe shortages of raw materials made it very difficult to continue the necessary research, but now the program is beginning to take shape, and as stated above, definite benefits should accrue to the chemical industry.

It is true that certain chemicals are unaffected by iron, but if an inexpensive synthetic coating can be developed, the chances of contamination from an unclean container are very much minimized.

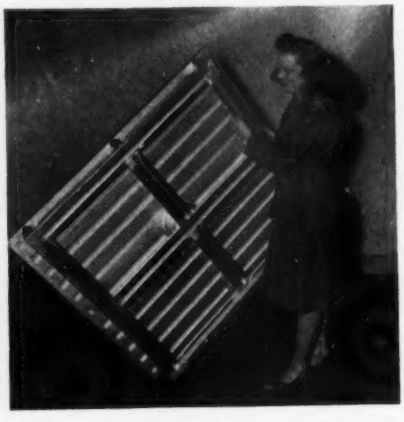
Economically, the use of synthetic coatings will be considerably cheaper than other methods of protecting products in steel drums. The scale of costs of the various types of steel containers is quite flexible. There is, for example, a considerable spread between the cost of a plain steel container and either a hot-dipped galvanized or hot tin-dipped container. There does not seem to be much chance to cut the cost of these two latter types, but it is felt that if lacquer or resin coatings can be developed to protect the particular product, the savings will be very substantial.

There is every reason to believe that the development of synthetic interior coatings for steel containers will progress very rapidly from now on. Most fabricators of steel containers are vitally interested in this program, and will welcome the opportunity to work with the chemical industry in order to develop the proper type of synthetic coating to meet the particular need. It is impossible to develop a universal coating for all products, but the number and kind of coatings can and will be minimized so that inexpensive synthetic coatings will afford the protection needed to ship chemical products safe and free from contamination.

Aluminum Pallets

At the present time, all pallets take the same freight rate as the goods they carry. Thus a carload of canned fruits and vegetables involves a charge of $18.50 for the 36 pallets (at 100 lb. each) on a typical shipment from New York to Chicago. The shipping charges on the same pallets would be $51.00 if they carried clothing, and so on.

Thus palletizing of light-weight goods that take a high freight rate involves an almost prohibitive shipping charge on the older type pallets themselves, a limiting factor that has had great influence



in preventing the extension of the fork-truck-pallet methods of handling to many shipping operations where it should be used.

The development of standardized aluminum pallets for use in handling goods where continued movement is involved is an important step in permitting the advantages of unit load handling to be extended to shipments over freight and truck lines. Also they are of value in subsequent movements through warehouse, to jobber and large retailer if the material is not long inactive.

Since the Reynolds 40 x 48-in. aluminum pallet weighs 36 lb. compared with about 100 for same size pallets made of other materials, shipping on aluminum pallets saves freight charges on 64 lb. per pallet.

ICC Regulations Amended

New amendments of the Interstate Commerce Commission Regulations for the Transportation of Explosives and Other Dangerous Articles became effective on August 19, 1946. We cite such of these as directly affect the chemical industry.

The list under sec. 4 was amended as follows:

1. Acrolein was canceled as a poison, Class A, and added as an inflammable liquid.
2. Cyclohexane was added to the regulations as an inflammable liquid.
3. Flue dusts, poisonous, were added to the regulations as a Class B poison.
4. Liquefied non-inflammable gases charged with nitrogen, carbon dioxide or air were added to the regulations as non-inflammable gases.
5 Liquids other than those classified as inflammable, corrosive, or poisonous charged with nitrogen, carbon dioxide, or air were added to the regulations as non-inflammable gases.
6. Mixtures or solutions of liquified non-inflammable gases and liquids other than those classified as inflammable, corrosive, or poisonous, charged with nitrogen, carbon dioxide, or air were added to the regulations as non-inflammable gases.
7. *Vinyl acetate, inhibited,* was added to the regulations as an inflammable liquid.
8. *Vinylidene chloride, inhibited,* was added to the regulations as an inflammable liquid.

The reason for these additions was to provide for the transportation of materials not heretofore regulated.

Sec. 105A was amended by additions of the following:

"(a) Acrolein must be inhibited and packed in specification containers as follows:

(b) Spec. 5A.—Metal drums of not over 55-gallon capacity each.

(c) Acrolein must not be offered for transportation by rail express."

Sec. 261A for the packaging of formic acid has been amended by addition of the following:

"(g) Spec. 1D.—Boxed glass carboys of not over 6.5 gallons normal capacity. Means shall be provided so that accumulated total

Buyer "scouting" for a better steel container

If your product is liquid, solid or semi-solid, there's a Continental steel container to package it. For Continental makes steel pails and drums in a wide range of sizes and types for virtually every industry.

For some time now we haven't been able to make enough containers to go around. But we have stuck to our policy, "the best in *quality*, the best in *service*." So when you plan ahead, think of Continental's Triple-C trademark and nationwide service facilities.

A COMPLETE LINE OF STEEL SHIPPING CONTAINERS

The Triple-C means best in quality, service

CONTINENTAL CAN COMPANY

100 East 42nd Street, New York 17, N. Y.

pressure in bottles shall not exceed 10 pounds per square inch gauge at 130° F., or shall vent at a pressure not to exceed 10 pounds per square inch gauge."

Paragraph (a), sec. 262 has been amended as follows:

"(a) Hydrobromic acid must not be over 49 per cent strength, and must be packed in specification containers as follows:"

The reason for this amendment is to permit the shipment of full 48% acid which may be slightly in excess of that strength due to manufacturing tolerances.

Paragraphs (f) and (m), sec. 272, were amended as follows:

"(f) Spec. 103A, tank cars. For acid of 1.5591 specific gravity (52° Baume) or greater strength. Spec. 103B or 103B-W, tank cars. For acid of not over 1.4 specific gravity (42° Baume).

(m) Spec. MC310.—Tank motor vehicles. For acid of 1.5591 specific gravity (52° Baume) or greater strength.

Spec. MC310.—Tank motor vehicles. for acid of not over 1.4 specific gravity (42° Baume)."

This amendment permitted transportation of sulphuric acid in tank cars and tank trucks of acid not hertofore permitted.

Paragraph (k), *sec. 303,* and paragraph (q) (1), *sec. 303,* have been amended, and we quote the amendment in full as it appears in the official docket of the Interstate Commerce Commission.

"Superseding an amendment table, par. (k), *sec. 303,* order Aug. 16, 1940, to read as follows:

"Kind of Gas	*Maximum permitted filling density (see sec. 303 (h)*	*Cylinders* marked as shown in this column must be used except as provided in note 1 and sec. 303 (p)(2) to 303 (p)(6).*
Methyl Chloride (see note 4)	Percent 84	ICC-3A300; ICC-3B300; ICC-4A300; ICC-4B300; ICC-3; ICC-4; ICC-25; ICC-26-300; ICC-38.
(Add) Liquified non-inflammable gases, liquids other than those classified as inflammable, corrosive or poisonous, and mixtures or solutions thereof, charged with nitrogen, carbon dioxide, or air. (See Note 10).	303 (j) (1) and (2) and the pressure in the container must not at 130°F. exceed 5/4 the marked service pressure of the container.	ICC-3A300; ICC-4B300; ICC-4D300.

"*Add.* Note 10. Containers must be equipped with approved safety devices and 4D spheres must be packed in strong boxes or crates (see section 25).

"Superseding and amending table, par. (q) (1), *sec. 303,* order Nov. 8, 1941, to read as follows:

"Name of gas	*Maximum permitted filling density, Note 1.*	*Required type of tank car, Note 2.*
Methyl chloride	Percent 84	ICC-106A500 Note 12 ICC-105A300

"The note to sec. 303 (q) (7) has been deleted to the following amendments:

"*Add* to (q) (7).

"Provided that for single-unit tank car tanks having water weight capacities not less than 86,240 pounds nor over 90,640 pounds, lagged with 4 inches of corkboard, equipped with one or more safety valves set to open at a pressure of 225 pounds per square inch the total discharge capacity of which must be sufficient to prevent building up of pressure in the tank in excess of 225 pounds per square inch, mounted on one car structure, tank jackets stenciled ICC-105A300 if tanks are forge-welded and ICC-105A300W if tanks are fusion-welded, and in all other respects constructed and maintained in full compliance with I. C. C. Shipping Container Specification 105A500 or 105A500W, the maximum quantity of liquified chlorine gas loaded into such tanks must be at least 107,800 pounds and not more than 110,000 pounds."

The reason for this deletion and addition to Sec. 303 (q) (7) is to provide for the continuance in service of tank cars which have been built and used to date for the transportation of liquified chlorine gas under authority of the note to sec. 303 (q) (7) made effective by order of the Commission December 18, 1941, and to provide for the building of additional cars of the same type constructed either by the fusion or forge welded process.

Section 346 (e) which covers the shipment of methyl bromide has been amended by the addition of the following:

"Outage must be sufficient to prevent cylinders or spheres from becoming entirely filled with liquid at 130° F. and when the vacant space (outage) is charged with nitrogen, carbon dioxide, or air, the pressure in the cylinder or sphere at 130° F. must not exceed 5/4 the marked service pressure of the cylinder or sphere."

Section 346 has also been amended by the addition of another paragraph including a new type of container, Interstate Commerce Commission Specification 4-D300. This addition reads as follows:

"(h) Spec. 4D300.—Metal spheres for aircraft use only, must be equipped with approved safety devices and must be packed in strong boxes or crates (see sec. 25)."

Section 355A has been amended to read as follows:

"(a) Arsenical dust, arsenical flue dust, and other poisonous noncombustible by-product dusts from metal recovery operations not subject to dangerous spontaneous heating, and arsenic trioxide, or sodium arsenate, when delivery is made to plants with private sidings, only, may in addition to containers prescribed in sec. 354, be shipped in sift-proof, self-clearing, hopper or bottom outlet steel cars or in sift-proof or steel flat bottom gondola cars with fixed sides and ends equipped with waterproof and dust-proof wooden or steel covers well secured in place for all openings, or in sift-proof box cars of all steel construction only when said cars are assigned exclusively to this service. See sec. 567 (b) for cleaning cars. Such cars, when exclusively in this service, are not subject to the requirements of sec. 567 (b).

The reason for this amendment is to provide for the transportation of by-product flue dust other than arsenical flue dust, which are properly classified as Class B poisons by the regulations.

Section 357 (a) (7) and 357 (a) (10) have been amended as follows:

"(a) (7) Bulk in watertight metal cars or in water-tight container car metal containers.

(a) (10) Bulk in watertight metal-bodied covered motor vehicles."

The reason for this amendment is to provide for an additional method of transporting cyanides or cyanide mixtures in bulk.

Shipping container specifications were amended by this order as follows: Interstate Commerce Commission Specification 3-A and Interstate Commerce Commission Specification 4-D were amended particularly in connection with their construction. References to the regulations will be necessary in order to determine changes which have been made by these amendments.

Interstate Commerce Commission Specification 10A, wooden barrels, was amended to include construction of additional woods, namely beech, sweet birch, yellow birch, or sugar (hard) maple. The reason these woods are included in Authorized Woods in the construction of I. C. C. (10) (a) barrels is to alleviate the present critical shortage of other woods now permitted.

Specification 11A has been amended by increasing the size of staves used for barrels not over 16" in diameter for authorized gross weights of 350, 450 and 600 lbs., from 28" to 28½". The reason for this change was to provide authority to use staves now commercially furnished by the industry.

BEMIS MINUTE MOVIES

for Shippers Who Want to Save Time and Money

"THE DOOM OF THE AWFUL AROMA"

Scenario: An Important Chemical is hard-working, invaluable to society . . . but people don't like to associate with it because it has halitosis (in other words, it's a social outcast).

How can our friend become a pleasant traveling companion? Simple! In odorproof containers, of course. (This fellow's breath is too strong for an ordinary container.) But won't *special* containers cost too much? What to do? What to do? . . .

Happy Ending: Our hero got wise, like a lot of other socialites, and began traveling in economical Bemis Waterproof Laminated Textile Bags. He rides safely, saves money and enjoys public approval. Everybody is happy again.

PRE-TESTS STOP PROTESTS! Bemis Waterproof Laminated Textile Bags head off complaints because they are tested *before* they are put to work. Their strength and tear-resistant, puncture-resistant qualities are pre-proved for you. And their economy is attested by thousands of users.

This Bemis Waterproof Bag is light in weight, yet is the strongest shipping bag made. It protects both ways — what's inside the bag and what's outside, too. It assures low-cost protection against escape or absorption of odors, change in moisture content, contamination, sifting, breakage, and many other common shipping complaints. It eliminates labeling costs and saves packaging and shipping costs.

A Bemis Waterproof Bag can also be made lintproof, acid-, oil-, or grease-resistant. Empty or filled, it saves storage space.

If the *exact* Waterproof Bag you need doesn't exist, the Bemis Shipping Research Laboratory will design it for you.

Write today for a copy of "Seven Facts About Low-Cost Protective Packaging".

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WATERPROOF DEPARTMENT

408 PINE ST. ST. LOUIS 2, MO.

Plants and Offices in 33 Principal Cities

PLANT OPERATIONS NOTEBOOK

Automatic Control Terminology V

Publication of automatic control terms a set forth by the American Society of Mechanical Engineers, began in the last issue and will be continued in this and ensuing issues. This list has been compiled by Donald P. Eckman of the Brown Instrument Company division of Minneapolis-Honeywell Regulator Co. and a member of the A. S. M. E. Terminology Committee of the Industrial Instruments and Regulators Division.—Editor.

700 Elements and Characteristics of Automatic Controllers

701 The *Measuring Means* consists of those elements of an automatic controller which are involved in ascertaining and communicating to the controlling means the deviation. (See Fig. 22.)

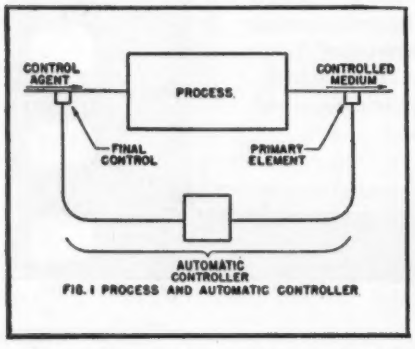

FIG. 1 PROCESS AND AUTOMATIC CONTROLLER

701a The *Primary Element* is that portion of the measuring means which first either utilizes or transforms energy from the controlled medium to produce an effect in response to change in the value of the controlled variable. The effect produced by the primary element may be a change of pressure, force, position, electrical potential or resistance. (See Figs. 1, 10 and 22.)

701b A *Self-Operated Measuring Means* is one in which all the energy necessary to actuate the controlling means of an automatic controller is derived from the controlled medium through the primary element. (See Figs. 2 and 22.)

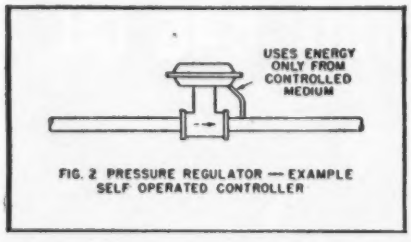

FIG. 2 PRESSURE REGULATOR — EXAMPLE SELF OPERATED CONTROLLER

701c A *Relay-Operated Measuring Means* is one in which the energy transmitted through the primary element is either supplemented or amplified for actuating the controlling means of an automatic controller by employing additional energy. (See Fig. 3.)

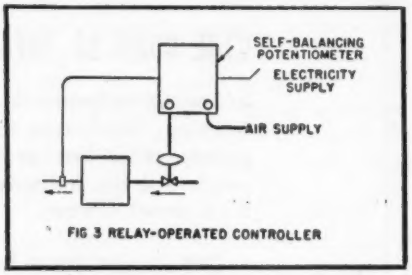

FIG 3 RELAY-OPERATED CONTROLLER

702 The *Controlling Means* consists of those elements of an automatic controller which are involved in producing a corrective action.

702a A *Power Unit* is a portion of the controlling means which applies power for operating the final control element. (See Fig. 23.)

702b The *Final Control Element* is that portion of the controlling means which directly changes the value of the manipulated variable. (See Figs. 1, 10 and 23.)

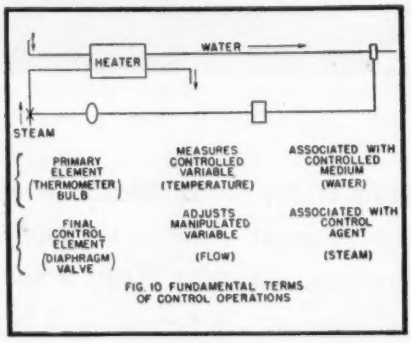

FIG. 10 FUNDAMENTAL TERMS OF CONTROL OPERATIONS

702c A *Self-Operated Controlling Means* is one in which all the energy necessary to operate the final control element is derived from the measuring means. (See Fig. 2.)

702d A *Relay-Operated Controlling Means* is one in which the energy transmitted from the measuring means is either supplemented or amplified for operating the final control element by employing additional energy. (See Figs. 3 and 23.)

Specifying Automatic Controllers

Many times in writing standard specifications for purchasing automatic controllers it has been necessary to devise terms to describe what feature or operation is desired. It is hoped that the ASME terminology will aid in this description. In some cases, it is desirable to specify the action by the actual ASME number of the term. An example, using general terms applying to any make but specifically denoting the type of control, follows.

It is assumed that a vapor-actuated pressure thermometer recorder with electric two-position control is desired.

Automatic Controller as follows:

1. Primary element—bulb with well.
2. Controlled variable—temperature recorded over range of 50 to 250° F. on 24-hour chart.
3. Controlled medium—oil at 100 psi. gauge and 220° F.
4. Measuring means — self-operated vapor actuated pressure thermometer.

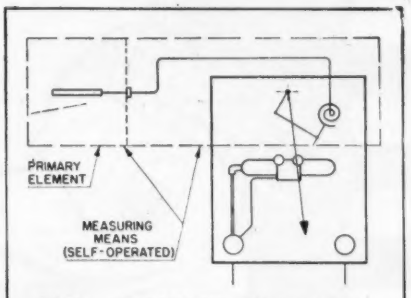

FIG. 22 — SELF OPERATED MEASURING MEANS

5. Desired value—220° F.
6. Controlling means—electrical contacts.
7. Controlling means supply—electricity 110 volts, 60 cycles.
8. Controller action—two-position—differential (ASME 501 aa).
9. Differential—0.1 per cent of full scale or less (ASME 602).
10. Set point—190 to 230° F.
11. Power unit—reversible electric motor.

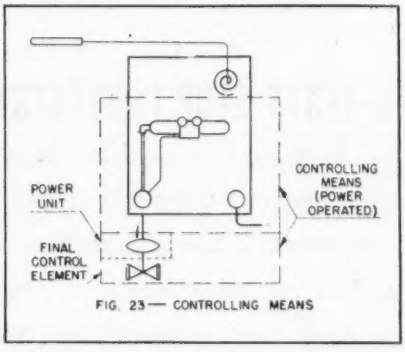

FIG. 23 — CONTROLLING MEANS

12. Final control element—single port globe valve for steam, 20 psi. pressure differential across valve and 1,000 lbs./hr. Tight shut-off required.
13. Control agent—saturated steam at 70 psi. gauge.

These specifications do not cover the application completely but they provide an example of how the foregoing terms may be used.

(*This page concludes* CHEMICAL INDUSTRIES *presentation of the definitions of automatic control terms as set forth by ASME. Previous installments will be found on page 832, May 1946; 1020, June 1946; 120 and 122, July 1946; 528, September 1946.*)

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LABORATORY NOTEBOOK

Microburette

A durable syringe-type microburette for measuring minute volumes of liquids was developed by California Institute of Technology chemists during the war, according to a report by the OPB. Department of Commerce (PB-5924; photostat, $3; microfilm, 50 cents; 40 pages).

The research was sponsored by the OSRD to find suitable apparatus for laboratory and field analysis of chemical warfare agents.

The apparatus consists of a syringe holder equipped with a precision micrometer movement. A glass hypodermic syringe is clamped in the holder, and fluids are discharged by turning a graduated micrometer knob. The maximum delivery of the instrument is approximately two cubic centimeters. The volume may be read to one microliter, and selected syringes afford a precision of one- or two-tenths percent.

Blueprints and test data are included in the report.

Orders for the report should be addressed to the Office of the Publication Board, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order, payable to the Treasurer of the United States.

Vertical Centrifugal Immersion Lab Pump

A small compact pump is claimed by its manufacturer, The Emil Greiner Co., 161 Sixth Avenue, New York 13, N. Y., to be noiseless, durable and unusually applicable to a large number of laboratory operations.

Specifications are as follows:

Outlet: ½OD turned up copper tubing or ¼" IPT optional;
Materials: bronze castings, brass, solder, gasket;
Motor: 1/80th HP, 1550 rpm average load speed, shaded pole, diameter 4" over fan housing;
Motor bearings: sleeve type with thrust protection;
Height: 14⅛" OA, extension below motor 10";
Leads: BX conduit box;
Weight: 8¾ lbs. net;
Service: Continuous duty for 110 volts, 60 cycle 1 phase current.

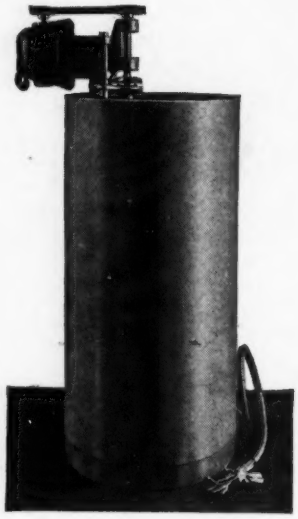
The pump may be used for agitating, for a recirculation system, emptying, filling or transferring, evaporative cooling, humidifying and air washing.

Thermometer Calibration

Newly perfected, electrically heated calibration tanks are announced for mercury (glass or metal) and gas-filled thermometers. They are practical both for the thermometer manufacturer and for large industrial, chemical and refinery plants where constant checks for accuracy of controlling thermometers are essential.

To meet the rigid specifications involved, a constant temperature bath is required. This can only be accomplished by full agitation of the heating medium at closely controlled temperatures.

In this improved Trent calibration tank a motor-driven auger-type agitator lifts



the heating medium (water, oil or salt, depending on the temperature required) from the bottom of the tank and spills it out at the top. This continuous displacement of liquid provides thorough mixing and constant temperatures.

The unit is cylindrical and consists of the main tank of heavy steel, refractory insulated; with a steel or copper inner tank. Between these are the heating elements. The top of the inner tank extends outward over the main tank wall, and part way down the outside, to prevent liquids from reaching the heating elements. The following sizes are available: 6" diam., 14" deep; 10" diam., 18" deep; 10" diam., 36" deep; 10" diam., 65" deep.

Tanks are generally furnished with Trent patented "Folded-and-Formed" heating elements, assuring even distribution of heat for temperatures from room to 1200°F. They are designed and manufactured by Harold E. Trent Company, 244 Leverington Ave., Philadelphia 27, Pa.

Deterioration of Analytical Weights

In a letter to *Chemistry and Industry*, publication of the Society of Chemical Industry (British), A. F. H. Ward reminds readers of a paper published by Manley (*Phil. Mag.*, 1933, *16*, (7), 489) reporting studies on the deterioration of analytical balance weights.

The correspondent says, in part, "The time is opportune, now that manufacturers are considering their postwar programs, to draw attention to the very unsatisfactory position in regard to analytical weights. Laboratory dealers normally provide gold-plated weights as their main selling line, with the alternative of nickel plating at a cheaper rate. Chemists who have worked with gold-plated weights will generally agree that after a few years' use the plating is in poor condition. . . . The metal is very soft and easily damaged and as soon as the layer of gold is penetrated corrosion of the underlying metal is facilitated by the electrolytic couple set up. . . .

"The very careful observations on the deterioration of precision weights made by Manley . . . . have been nearly completely overlooked. For comparable weights of different materials he found the following alterations in mass during the storage time of one year:

		Ratio
Brass, chromium-plated	0.0134 mg.	1
Brass, nickel-plated	0.0543 "	4.1
Nichrome	0.0750 "	5.6
Brass, lacquered	0.0906 "	6.8
Brass, polished	0.1113 "	8.3
Brass, gold-plated	0.3216 "	24.0

"A chromium-plated finish was shown to be by far the best among those tested, and gold plating allowed corrosion to take place 24 times more rapidly than with chromium. Differences in storage conditions affected the absolute rates of corrosion but did not substantially affect their relative values. These figures confirm general observations made by myself and also by other chemists with whom I have discussed the problem. . . .

"Incidentally, Manley came to most important conclusions about the best methods for storing weights. A plain hardwood box is best for ordinary purposes. Velvet-lined boxes are unsatisfactory, because acid from the glue used to fix the velvet causes corrosion. . . .

"It is probable that . . . . other superior coating metals might be found. For example, rhodium plating has an extremely high resistance to corrosion. . . ."

Photoelectric Colorimeter

A new Lumetron photoelectric colorimeter (Model 450 for Nessler tubes) is manufactured by Photovolt Corporation, 95 Madison Avenue, New York 16, N. Y.

This instrument is designed particularly for the measurement of faint colorations and turbidities. It is suited for the trace analysis of water, metals, soil extracts, and any other determinations in which only a comparatively slight coloration can be developed. It is also suited for color grading of lightly colored liquid products.

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Filtration

THEORY AND PRACTICE OF FILTRATION, *by George D. Dickey and Charles L. Bryden.* Reinhold Publishing Corp., N. Y., 1946; 346 pp., $6.00. Reviewed by Charles F. Bonilla, Johns Hopkins University.

THIS MONOGRAPH is timely and welcome on account of the many new types of filters developed since Wright's treatise of 1923.

The characteristics of different filters are well presented under some or all of the headings; construction, operation, materials handled, advantages, disadvantages, sizes, applications and materials of construction. Each filter averages some two pages, and apparently no standard type has been overlooked. Unfortunately, few if any data on weights and costs are presented, such as are already available for plate and frame filters, in particular. Additional chapters on history, filter media, testing and selection of filters, auxiliaries, and objectives and preparation for filtration are appropriate, though clear descriptions of washing plates, thickener presses, characteristics of centrifugal slurry pumps, valves on piston slurry pumps, etc., are lacking. There are few errata, but some symbols are not defined or not standard.

It is felt, however, that this volume fails to fill the empty niche for a textbook-manual on filtration due to a superficial and qualitative treatment of theory. Much of the theory given is directly quoted, which seems inappropriate. The following material is conspicuously absent: the application of the Ruth and Lewis equations, a tabulation of observed filtration coefficients, filter capacity and cost as functions of cycle length, effectiveness of filter aids (Carman), permeability of cakes (Kozeny), hydraulic pressing theory, problems for students, etc.

In short, this book will be quite useful to the practical engineer, but considerably less so to the modern student or theoretically-minded engineer. It is hoped that a future edition may be expanded to overcome this situation.

Process Control

PRINCIPLES OF INDUSTRIAL PROCESS CONTROL, by D. P. Eckman. John Wiley & Sons, Inc., New York. 237 pp. Reviewed by H. S. Winnicki, Westvaco Chlorine Products Co.

AS INDUSTRIAL processes increased in complexity and quality requirements became more stringent during recent years, process control problems arose and led to the development of a variety of control equipment. However, just the availability of automatic control equipment did not simply solve the problem of controlling the process. In order to properly apply control equipment to the process certain fundamental characteristics of the process and control system had to be known and understood. During the past thirteen years a number of articles have appeared in the literature analyzing both process and control system characteristics as applied to automatic control. The growth of automatic control theory as well as equipment also gave birth to a large number of terms. In many cases different terms were used by different equipment manufacturers and writers to define the same thing which resulted in general confusion.

"Principles of Industrial Control" develops the underlying principles of automatic control by bringing together and correlating the literature and expanding it with experimentally determined values, characteristic equations, graphs, and illustrative examples. The many terms and definitions used throughout the book are based on those prepared by the A. S. M. E. Industrial Instruments and Regulators Division Committee on Terminology.

This book should prove of interest and value to the engineer who has a working knowledge of instruments and controls. It should be particularly valuable to those who are directly concerned with instrumentation and automatic control. For the beginner or engineering student who is not familiar with actual control equipment the book probably does not contain sufficient background material to become completely understandable.

Biochemistry

CURRENTS IN BIOCHEMICAL RESEARCH, *David E. Green, Editor.* Interscience Publishers, Inc., 215 4th Avenue, New York 3, N. Y. 486 pp., price $5.00. Reviewed by L. J. Teply, Columbia University.

THIS IS a good book. Thirty-one experts have written essays on various phases of biochemistry, setting their relation to the general field today and philosophizing as to the future. One finishes each chapter wishing that the author had gone further, and thus the avowed purpose of the book to "excite the imagination and provide glimpses of some of the fascinating horizons of biochemical research" would seem to have been admirably fulfilled. If any criticism of the selection of authors can be made it is that the list is rather top-heavy with men from Columbia University and the Rockefeller Institute for Medical Research. Nevertheless, high quality has been maintained and all of the authors are generally recognized as investigators of the front rank. About three-quarters of the book, though scholarly, can be readily understood and thoroughly enjoyed by any one with an elementary grounding in biological science. Some of the chapters on enzyme kinetics, however, will provide heavy going even for some who are well trained in general biochemistry. The book hangs together well and only a few harmless typographical errors were found. For some years to come this volume undoubtedly will be read assiduously by graduate students preparing for comprehensive examinations.

Other Publications

FUNDAMENTALS OF CHEMISTRY, by L. Jean Bogert, has been issued in a 6th edition by W. B. Saunders Co., Phila.; 571 pp., $3.00. Designed primarily as an introductory course for nursing, home economics and other biological students, it attempts to cover the basic theories, organic and inorganic chemistry, and biochemistry in one volume. The treatment is obviously limited in scope, but it appears to be admirably suited to its purpose. Accompanying this text and supplementing it for laboratory practice is

LABORATORY MANUAL OF CHEMISTRY, by L. Jean Bogert, 5th edition, W. B. Saunders Co., Phila., 196 pp., $1.00. This book describes experiments designed for a laboratory course to accompany a lecture course based on the text described above. An aid to teachers is an accompanying booklet outlining four courses of varying length and difficulty depending on the preparation and requirements of the students.

RUBBER RED BOOK, published by The Rubber Age, 250 W. 57th St., N. Y. C. 19, and sold for $5.00, has been issued in its latest biennial edition. It is a comprehensive directory of rubber manufacturers and suppliers of machinery, raw materials, and the like. There is much additional information of value to those in the rubber field.

SOME PROPERTIES AND APPLICATIONS OF DDT titles a pamphlet published by His Majesty's Stationery Office, London, and available for 15¢ from British Information Services, 30 Rockefeller Plaza, N. Y. C. 20. It collects together the salient features of investigations in the British Commonwealth and in this country. It discusses the physical and chemical properties of DDT, its toxicity to insects and other animals including vertebrates, formulations, and means of dispersal.

Two technical reports, THE CORROSION OF FEED SCREWS OF SMALL UNDERFEED STOKERS and APPLICATION OF OVERFIRE JETS TO PREVENT SMOKE IN STATIONARY PLANTS, are available at 25¢ each from Bituminous Coal Research, Inc., 912 Oliver Bldg., Pittsburgh 22, Pa.

THE LIMITATIONS OF OPTICAL IMAGE FORMATION, by Max Herzberger, describes a mathematical tool of use to the optical designer. Bound reprints of the article, published in the Annals of the New York Academy of Sciences, are available from the Academy, Central Park West at 79th St., N. Y. C. 24, at 75¢ each.

MACHINING ALUMINUM ALLOYS is the subject of a 124-page manual available from Reynolds Metal Co., Dept. 47, 2500 S. 3rd St., Louisville 1, Ky.; $1.00.

COLLECTED ABSTRACTS published during 1945 on spectrochemical analysis are compiled by Erwin S. Hodge and sold by the Ohio Valley Spectrographic Society, Engineers Club Bldg., Dayton, Ohio, for $1.00 cash with order or $1.25 when billing is required. Over 80 references are cited in the 64-page booklet.

NUCLEONICS is the title of a 38-page 8½" x 11" booklet which explains "what everybody should know about atomic physics." It is based on official material prepared under the auspices of the U. S. Navy Department and is well illustrated with graphic drawings. Progress Press, 2153 Florida Ave., Washington, D. C.; $1.00.

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BOOKLETS & CATALOGS

Chemicals

B100. BUTANE. "Plant Additions Increase Butane Recovery" titles a recent 8-page booklet available from Clark Bros. Co., Inc.

B101. CHEMICALS. Price List. Magnus, Mabee & Reynard, Inc.

B102. CLEANING COMPOUNDS. "Production and Maintenance Cleaning" titles a booklet which is available from Phillips Chemical Co.

B103. GREASE RESISTANT FINISHES are the subjects of Textile Finishing Bulletin 115, which is available from the Textile Resin Dept. of the American Cyanamid Co.

B104. 2, 4-D. The Pennsylvania Salt Manufacturing Co. has issued a new 8-page leaflet describing the action of Penco 2, 4-D weed killer.

B105. DDT. Erusto DDT emulsion for use in laundry and dry cleaning plants is the subject of recent 4-page leaflet of the Pennsylvania Salt Mfg. Co.

B106. FLUORINE. The Pennsylvania Salt Manufacturing Co. has issued a preliminary manual (No. F-1) titled "Fluorine, Properties and Method of Handling."

B107. GRAPHITE Colloidal graphite is the subject of a new 16-page bulletin, available from Acheson Colloids Corp.

B108. MEDICINAL PLANTS. "Medicinal and useful Plants in Brazil" titles an 18-page booklet available from the Brazilian Government Trade Bureau.

B109. ORGANIC CHEMICALS. Sharples Chemicals, Inc., has issued the 14th issue of their general catalog, 72 pages, which describes their commercial or semi-commercial organic chemicals.

B110. PIGMENTS. "Chloroplast Pigments" titles a recent bulletin concerning the natural pigments being extracted from plant growths by Midwest Extraction Co.

B111. PLASTICIZERS. "The Arneels as Plasticizers" titles a recent 4-page bulletin available from the Armour Chemical Div. of Armour and Co.

B112. PROTECTIVE COATING. The Amercoat Division of the American Pipe and Construction Co. has issued a new 8-page technical buletin containing factual information about the Amercoat line.

B113. PROTECTIVE COATINGS. "Protective Strip Coatings of Eastman Cellulose Acetate Butyrate" titles a recent 4-page bulletin which is available from Tennessee Eastman Corp.

B114. RESIN FINISHES The Textile Resin Department of the American Cyanamid Co. has published a new bulletin (No. 103) describing their Sheerest and Lacet resin finishes.

B115. ROSIN RUBBER is the subject of a 6-page bulletin giving the story of Hercules Dresinate 731, which is available from the Hercules Powder Co.

B116. RUBBER PIGMENT. Witcarb R is the subject of a 40-page bulletin (No. 46-2) which is available from the Witco Chemical Co.

B117. SILICONES. "Silicone Fluids for Used in High Vacuum Diffusion Pumps" titles the latest issue (No. 2) of the Notebook Fluid Series of the Dow Corning Corp.

Equipment

F867. ALLOYS. "Misco Alloys" titles a recent bulletin (No. G-1) which is available from the Michigan Steel Casting Co.

F868. ALLOY SPECIALTIES. Material manufactured from Worthite are the subjects of a new 8-page catalog (No. W-350-B5A), available from the Worthington Pump & Machinery Corp.

F869. BULK HANDLING. "Handling Sugar in Bulk" titles a 36-page booklet available from The Great Western Sugar Co.

F870. CHEMICAL FEED SYSTEMS. The Milton Roy Co. has issued a 4-page booklet (No. 468) describing their controlled volume chemical pumps and automatic chemical feed systems.

F871. COMPRESSORS. The Worthington Pump and Machinery Corp. has a 24-page catalog (No. L-640-B1A) available concerning their single-stage horizontal compressors.

F872. COMPRESSORS. The Worthington Pump and Machinery Corp. has issued a 32-page catalog (No. L-680-B1A) describing their new steam-driven opposed compressors equipped with feather valves.

F873. CONDENSATE RETURN. The Cochrane Corp. has issued a 16-page bulletin (No. 3250) describing their method of gaining condensate for process equipment for return to the boiler.

F874. CONTROLLER. The Foxboro model 40 controller is the subject of a recent booklet (No. 381) of the Foxboro Co.

F875. CONVEYOR LUBRICATION is the subject of a recent chart (D182) available from Rapids-Standard Co., Inc.

F876. DEMINERALIZERS. The new model C-B N demineralizers of Cochrane Corp. are the subjects of a 4-page bulletin (No. 4266).

F877. DUPLEX TUBING is the subject of a technical bulletin (No. 746) which is available from the Bridgeport Brass Co.

F878. ELECTRICAL EQUIPMENT. "Rotating Electrical Equipment to Meet Your

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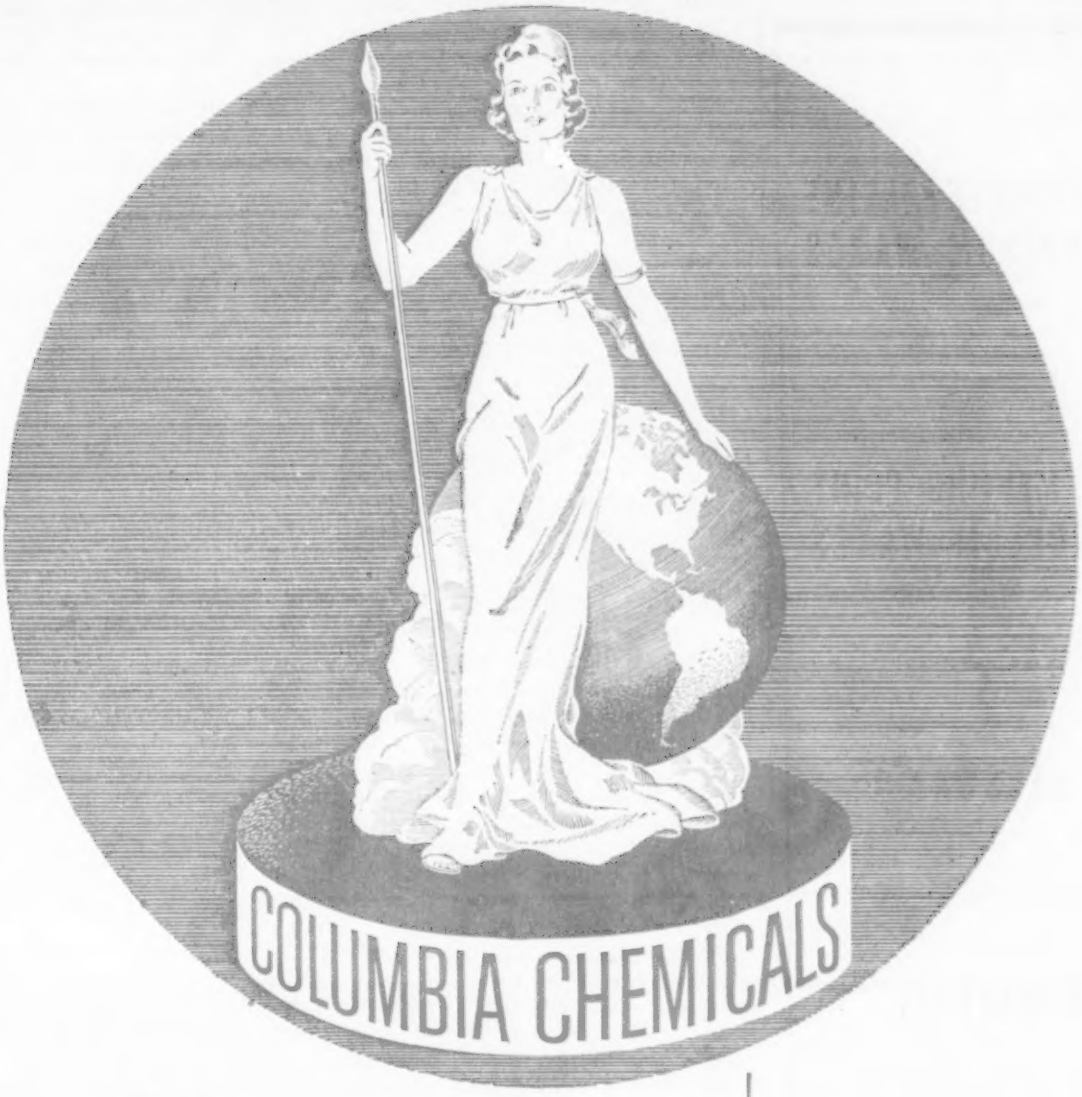

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Specific Needs" titles a recent catalog (No. 46-1) available from Electric Specialty Co.

F879. ELECTRIC MOTORS. Protected-type motors are the subject of a new bulletin (No. SL-300-3) just issued by the Crocker-Wheeler Electric Mfg. Division of the Joshua Hendy Iron Works.

F880. ELECTRONIC HEATING. "Electronic Heating and Sealing with the Thermatron" titles a new 8-page booklet (No. 7005) issued by Radio Receptor Co.

F881. EQUIPMENT. The Fluor Corp. has recently issued a new 20-page general catalog (No. 46).

F882. EXPANSION JOINT. The packless expansion joints produced by the Magni-Lastic Division of Cook Electric Company are pictured and described in a recent 12-page bulletin.

F883. FILTER FABRIC FINISH. The Metakloth Co. has issued a 4-page bulletin describing Thoratex, their chemical finish for patent filter fabrics.

F884. FILTERS. The Davis Filtration Equipment Co. has issued a 12-page catalog describing their "200" series of pressured leaf type filters.

F885. FIRE HOSE. The American-La-France-Foamite Corp. has issued an 8-page booklet describing their new water-repellent fire hose.

F886. FIRE PROTECTION. "How to Fight Fires and Protect Property" titles a new 20-page booklet (N. R-5827) which is available from Randolph Laboratories, Inc.

F887. FLOOR TRUCKS. A 4-page bulletin (No. TR-NSP-4) is available from the Rapids-Standard Co., Inc.

F888. GASKETS. The United States Gasket Co. has issued a 30-page catalog (No. 303) describing their spiral-wound metal and asbestos gaskets.

F889. GRAVITY CONVEYOR. The Rapid-Roller gravity conveyor is the subject of a recent 4-page folder, available from the Rapids-Standard Co., Inc.

F890. HEAT EXCHANGE. Bentube sections are the subjects of a 24-page bulletin (No. 1601) which is available from the Griscom-Russell Co.

F891. HEAT EXCHANGE. "G-R Tubeflo Sections" titles a recent 12-page bulletin (No. 1621) available from the Griscom-Russell Co.

F892. HYDRAULIC PIPE BENDER. The Watson-Stillman Co. has issued an 8-page bulletin (No. A-7) picturing and describing their portable hydraulic pipe bender.

F893. HYDRAULIC PRESSES are the subject of a bulletin (No. 370-C) available from the Watson-Stillman Co.

F894. INSTRUMENTATION. "Pneumatic Transmission of Instrument Readings Over Long Distances" titles a recent 12-page bulletin (No. B59-2) which is available from Brown Instrument Co.

F895. INSTRUMENTATION. The Brown Instrument Co. has issued a 22-page bulletin (No. Oil-M-2) titled "Brown Instrumentation for the Fluid Catalytic Cracking Process."

F896. JAR MILLS and Jar Rolling Machines are the subjects of a new 24-page catalog (No. 63) available from Abbé Engineering Co.

F897.* MOLDING MACHINE. The Watson-Stillman Co. has announced the publication of a plastics catalog file covering all Watson-Stillman products of interest to the plastics molding industry. Inquiry must be on business letterhead.

F898. MOTORIZED TRUCK. "Bluebook of Transporter Users" titles a recent booklet issued by Automatic Transportation Co.

F899. PIPE AND FITTING MATERIALS. Tube Turns has recently issued a new chart of pipe and fitting materials.

F900. TEST CAPSULE. "Quick, Accurate Pickling Tank Tests" titles a recent 4-page folder of Ferro Enamel Corp.

F901. THERMOMETERS. The thermometers of Palmer Thermometers, Inc., are described in two bulletins (No. 46-2 and No. 46-3).

F902. TIME SWITCHES are the subject of the recent 4-page folder (No. T-55) which is available from the Automatic Temperature Control Co.

F903. TRANSFER MOLDING MACHINES are the subject of a recent 8-page bulletin (No. 641-A) issued by the Watson-Stillman Co.

F904. TWO STAGE VOLUTE CENTRIFUGAL PUMPS are the subject of a new 4-page bulletin (No. 229) available from Warren Steam Pump Co.

F905. VIBRATION INSULATORS are the subjects of a recent 12-page bulletin of The B. F. Goodrich Co.

F906. WATER DEMINERALIZERS are the subject of a recent 4-page bulletin (No. 112) issued by Barnstead Still & Sterilizer Co.

Adequate stocks of Witco Stearates are strategically located to provide prompt, nationwide delivery. Superior, dependable quality of Witco Stearates is assured by the adequate technical control characteristic of all Witco manufacturing. In order to provide for the expanding needs of postwar applications for these stearates, the production facilities of the Franks Stearates Division have been doubled. The present line of stearates includes—aluminum, barium, calcium, lead, lithium, magnesium, sodium, zinc—and deliveries can be made promptly.

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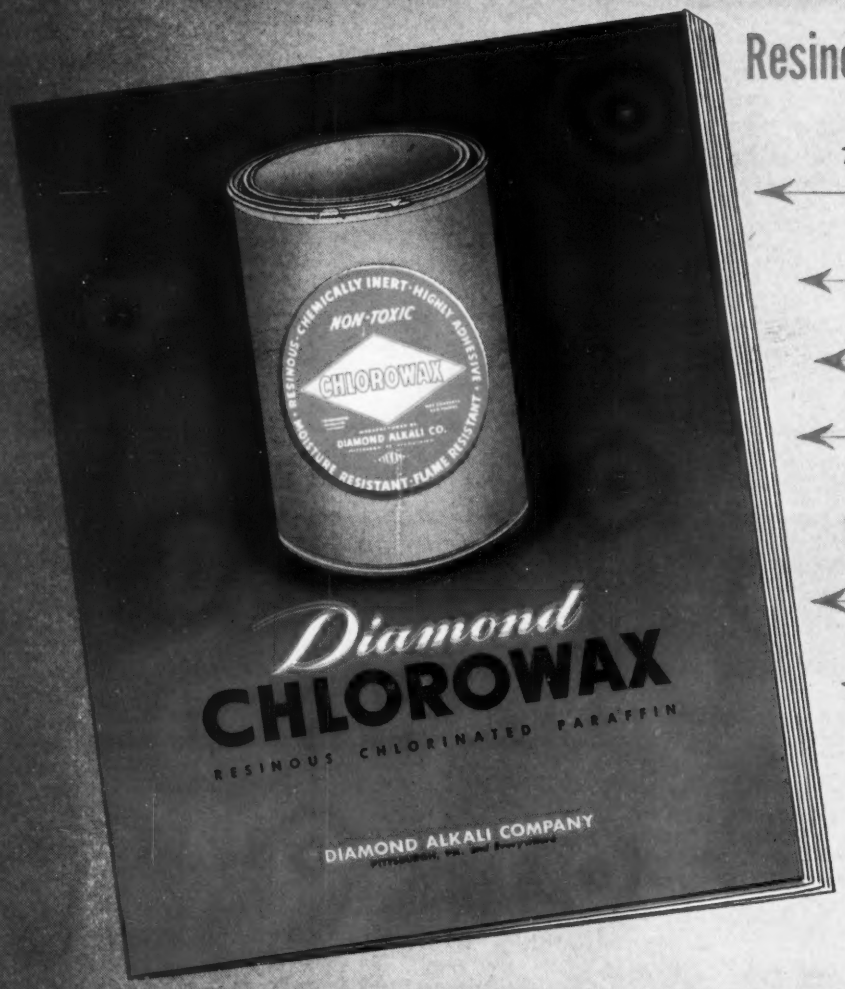

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NEWS OF THE MONTH

Broader Trademark Protection Offered By Lanham Act

FEW industries have a larger stake in trademarks than the chemical industry, and consequently chemical manufacturers have been in the forefront among those concerns which gained or suffered through trademark litigation. In many instances within recent years established manufacturers have been exploited by fly-by-night tradename pirates, often as a result of the inadequacy of the outmoded trademark act of 1905. In other instances, admittedly, they have been penalized as a result of their own flagrant abuse of the rules for tradename preservation.

Although the basic problems of both promoting and protecting a trademark or brand name remain largely the same considerable task they always were, the passing of the Lanham Act—eight years after it was introduced in Congress—should mean greater protection for trademarks than has ever existed before. After next July, when the Act becomes law, trademark registration will be simplified and the degree of protection more clearly defined.

The Lanham Act is not all that many manufacturers would wish, but it does possess some fundamental improvements. And one of these is the concrete incentive it provides for trademark registration. Heretofore many a company didn't bother; if another concern started using its name the first company could always stop the infringement by establishing prior use—even if it had not registered the tradename. This meant real headaches for numerous corporations.

When launching a new product the legal department of any national company had to institute a major, expensive search to learn whether the proposed name was already in use. Often it would locate a few small concerns using such a trademark, buy up the rights, and feel it was in the clear. Later, after it had invested heavily in promotion, it might hear from another small, locally-operating company, claiming infringement, establishing prior use, and threatening suit.

The Lanham Act should obviate this possibility. If a locally-operating concern does not register a trademark it will still have rights to the name, but only in the section of the country in which it has been doing business. It can no longer threaten the national distributor. Any company will be able to tell at a glance—through the national registry—whether a name can be substantially its property. It may have to steer clear of special territory—but it cannot be harassed.

Another feature specifies that trademarks come only under federal jurisdiction—to avoid complications which threatened in the '30's when several states considered compulsory registration of trademarks. Broader coverage is provided also, for it is clear that, besides product names, slogans and distinctive features of advertising can be insured.

A flaw in the previous legislation will also be eliminated. Heretofore all marks were good for 20 years, and as a consequence the files of the U. S. Patent Office were crammed with names no longer used. The new Act would clear out the deadwood, and all tradenames will die in six years unless the registrant files an affidavit either proving use of the trademark, or providing a substantial reason why he has not.

The Act also contains an innovation in trademark regulation which permits cancellation of marks for a variety of reasons following institution of proceedings with the Patent Office by the Federal Trade Commission. It is expected that such occurrences will be infrequent, and that a provision will be worked out with the FTC which will carry out the full spirit of the law.

Babassu Unaffected by Brazilian Ban

A recent decree of the Brazilian Government, prohibiting the exportation of certain fats and oils until further notice, will have no effect on the agreement with Brazil for the purchase of babassu kernels and oil by the United States, it is announced by the Department of Agriculture. Exclusion from the export ban of babassu kernels and oils contracted for by the United States is of great importance because of the need for the oil for soap manufacturing and other industrial uses.

Under a four-year agreement originally reached July 25, 1942, Brazil agreed to sell not less than 75 per cent of its babassu output to the United States in the form of kernels or oil. This agreement, as it was about to expire, was extended until July 24, 1947, but reduced the quantity available to the United States to 50 per cent. Brazil's production of babassu kernals for 1946 is placed at 60,100 short tons.

The Brazilian export prohibition covers animal fats and specified vegetable oil seeds and oils, including babassu kernels and oil, except those set aside for the United States. Other oleaginous prod ucts, affected by the decree are copra, palm, ouricury, tocum and their respective oils, cottonseed and peanut oil.

Fox Appointed Research Director

Arthur L. Fox, appointed director of the Central Research laboratory of General Aniline & Film Corp. to succeed W. E. Hanford. A substantial part of the laboratory's work is devoted to dyestuff and photographic process development.

Plan Utilization of Foreign Scientists' Skills

Continuation of the joint State-War-Navy program for utilizing the scientific knowledge and skills of selected German and Austrian specialists in science and technology to further American military research and development has been announced by the State, War and Navy Departments.

It is planned within the next several months to bring to the United States additional volunteer Austro-German specialists to join the more than 200 brought over since the end of the war in Europe.

These men, who will be thoroughly screened on the basis of ability and potential contribution to furthering America's military and industrial development necessary to the defense and prosperity of the nation will at first concentrate their efforts exclusively on Army-Navy projects.

Upon completion of their work for

the Army and the Navy they will be made available to American industry through auspices of the Department of Commerce after a further thorough screening and investigation to determine their eligibility for status under immigration laws.

Debate Rosin Export Quota

An export quota of 75,000 drums of gum and wood rosin for the third quarter of the crop year (fourth quarter of the calendar year) has been recommended by the Chemicals Division of the Civilian Production Administration, Wells Martin, Government Presiding Officer, told the Wood Naval Stores Industry Advisory Committee at a recent meeting.

This quota, if approved, would mean export of rosin for the crop year of 325,000 drums unless an additional quota should be set for the fourth quarter. However, this is unlikely, Mr. Martin said, because there is virtually no production of gum rosin from January 1 to March 31.

It is estimated that the rosin export quota for the current crop year will be less than 20 per cent of production, although in prewar years more than half of the American production was shipped abroad.

Mr. Martin told the committee that the third quarter quota had been reduced to 75,000 drums because it was estimated that domestic consumption and exports would reduce stocks of rosin in the United States to 350,000 drums on April 1, 1947, the beginning of the new crop year. This, he added, would be the lowest carry-over on record.

Charge Vitamin D Trade Restrained

The Wisconsin Alumni Research Foundation, Standard Brands, Inc., and Gelatin Products, Inc., are charged with conspiracy in restraint of trade in a suit for $468,000 damages, filed by Rene Douglas, for Douglas Laboratories, in the United States District Court in Chicago.

The complaint alleges that the defendants denied Douglas Laboratories materials essential to the making of vitamin D products from 1927 until August 14, 1946, when the so-called "Steenbach patent" agreements were outlawed.

Government Issues Farben Report

Chemical formulas and detailed information on the manufacture of inorganic and organic chemicals at the I. G. Farbenindustrie plant at Leverkusen, Germany, are contained in a report released by the Office of Technical Services, Department of Commerce.

Prepared for the Combined Intelligence Objectives Subcommittee by L. C. Turnock and F. R. Lowdermilk, the 87-page report describes industrial uses for the wide variety of organic and inorganic chemicals produced at Leverkusen, as well as manufacturing methods, unit costs, and power requirements for production. Numerous flow sheets are included.

The inorganic chemical compounds and processes discussed in the report include: barium compounds, carbon and chlorinated carbon compounds, ceramic colors and fluxes, activated charcoal, chlorine, sodium hydroxide and hydrogen, chromium compounds, chromizing of steel surfaces, fluorine and fluorine compounds, hydrazine hydrate, hydrogen chloride, lithopone, oxygen, sodium compounds, sulfur-chlorine compounds, titanium compounds, vanadium pentoxide, zinc compounds, and zirconium compounds.

The organic chemicals described in the report are: phenol, diphenyl, disocyanates, tanning agents, amines, chlorinated hydrocarbons, piperidine, rubber accelerators, rubber antioxidants, and resins.

Orders for the report (I. G. Farbenindustrie, A. G., Leverkusen; PB-6687; photostat, $6; microfilm, $1) should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C.

ACS Extends Placement Service

The American Chemical Society has opened a New York clearing house for chemists and chemical engineers completing the organization of a nationwide employment service for the chemical profession with offices in seven cities.

Similar in purpose to the clearing house conducted at the society's national meetings each spring and fall, the regional service will function throughout the year as a liaison agency, bringing together employers looking for chemists and chemical engineers, and society members and student affiliates desiring such contacts.

The New York office, which will serve the Middle Atlantic region, has been set up in Room 93 in the Chemists' Club Building, 50 East 41st St.

Tighten Penicillin Testing Regulations

The Federal Food and Drug Administration has approved a tightening of its heat stability test for crystalline penicillin, recently.

With official announcement of the amended regulation in the Federal Register, only crystalline penicillin losing no more than 10 per cent of its potency after being kept at 100 degrees Centigrade for six days will be approved for commercial distribution. At present, FDA is approving crystalline penicillin losing no more than 25 per cent of its potency after the heat test.

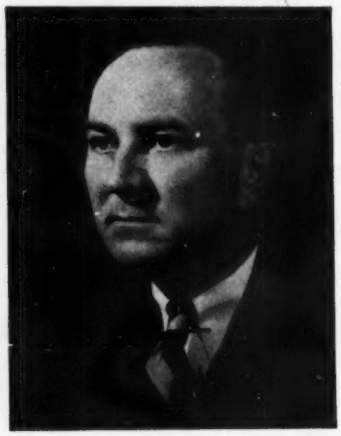
Appraise Synthetic Mica Potentialities

Synthetic mica developed in Germany may be better than natural mica for certain specialized telecommunication uses, according to a report now on sale by the Office of Technical Service.

The report describes German synthetic mica research and pilot plant work at the Siemens-Schuckert plant and at the Kaiser Wilhelm Institute for Silicate Research.

The synthetic product, according to the report, would cost about 10 times as much as natural mica for general use. However, synthetic mica, with its highly uniform quality, elasticity, and strength, might actually be less expensive for high-grade condensers than the best Indian muscovite, since the cost of selecting and testing for

Carswell and Bachman Named to Research Posts



T. S. Carswell (left) and Paul W. Bachman, have recently been appointed manager of research and development, and technical development manager, respectively, Commercial Solvents Corp. Mr. Carswell was formerly with Monsanto Chemical Co. and is co-author of some 40 patents. Dr. Bachman joined C. S. Co. in 1942 as assistant director of research after being associated with Du Pont, Victor, and General Chemical.

quality would be drastically reduced. Too, emergency production of synthetic mica for general use might prove valuable if we should again be cut off from imported supplies.

The synthetic material is similar in theoretical composition to natural phlogopite mica, but posses superior qualities for use in electrical equipment.

The Siemens-Schuckert mica is made by melting tablets which contain aluminum oxide, magnesium oxide, sand, and potassium silicofluoride mixed in the proper proportions in a covered crucible, specially designed for the purpose. The loaded crucible is first preheated to about 900 degrees Centigrade in an electrical resistance furnace. It is then moved to a gas oven, where the temperature is raised to about 1450 degrees Centigrade.

The oven is cooled very slowly from the bottom up. As the molten mass cools, mica crystals form around a piece of sintered alumina, placed at the bottom of the crucible. Under properly controlled temperature conditions, the mica sheets begin to form at this base and extend vertically up through the crucible.

Both the eiectrical resistance and the breakdown resistance of the synthetic material are higher than natural mica. It is harder than muscovite, and its melting point (1300 C) is about 700 degrees higher. It was used in Germany for heavy-duty condensers, and since it does not discharge gases under high vacuum may make possible the development of completely noiseless radio tubes.

Chemical Employment Shaded

Employment in factories engaged in the manufacture of chemicals and related products in the United States noted a 9.8 per cent decrease from June to July, according to the Bureau of Labor Statistics. At the end of the monthly period, employment was 2.9 per cent below the corresponding level of 1945. Payrolls showed a 9.9 per cent decrease from June to July, and stood 2.1 per cent below the corresponding level of 1945.

The Bureau of Labor Statistics index number for factory employment in the chemical group of industries for July was 162.5 (100 equals 1939 average), compared with 165.1 for June and 223.2 for July last year. For payroll totals the index number was 284.3 for July and 397.8 for July last year.

Paint Firms Subsidize Fellowships

Thirty-nine northern Ohio paint companies are cooperating in the establishment of three graduate research fellowships at Case School of Applied Science to encourage study, research and development work in paint technology.

The paint firms have underwritten a fund of $15,000 through the Joint Educational Committee of The Cleveland Paint and Varnish Production Club and The Cleveland Paint, Varnish, and Lacquer Association to establish the fellowships for a period of three years.

Named Powell Export Vice-president

David G. Hoyer, appointed vice-president of the John Powell Export Corporation, New York. Mr. Hoyer, who was assistant to the export manager since his release from the Navy a year ago, was purchasing agent of the Powell company before the war.

Ban Use of Farben Trademark

The Allies have forbidden use of I. G. Farben industries name and trade mark on any products produced for sale in remaining plants of the former German chemical trust, the American Military Government has announced.

The four-power I. G. Farben control committee, which is executing dissolution of the trust for the Allied Control Council, is conducting an open market sale of 35 of Farben's smaller plants in all four occupation zones which can be operated independently.

American policy is that these plants shall, as far as possible, be sold into private hands for a diffusion of ownership.

Pyrethrum Exporters to Visit U. S.

A delegation from the Pyrethrum Board of Kenya will come to the United States shortly for "important discussions" with importers and processors of pyrethrum. While in this country, the delegation will make its headquarters at the offices of the Greene Trading Company, 70 Pine street, New York 5.

The delegation will be headed by R. E. Norton, commissioner in London for East Africa. It will also include W. F. B. McLellan, chairman of the Pyrethrum Board of Kenya; R. H. O. Lopdell, assistant manager of the Kenya Farmers' Association, and two scientists, Dr. Coomber and Dr. Furlong.

Penicillin Plant For Sweden

Alexander Redniss, president of Technical Enterprises, Inc., consulting and contracting engineers, announces that his company was recently awarded a contract for the construction of a penicillin plant in Sweden.

Pilot plant production is expected to commence early this winter. The main plant will be ready for operation in the spring of 1947.

Plan New Wood Research Laboratory

A Pacific Northwest laboratory to place research in close contact with treatment of Douglas Fir and other western species will be opened November 1 at the Wauna, Oregon plant of the American Lumber and Treating company, F. W. Gottschalk, Chicago, company technical director reports.

Besides the plant operation itself, facilities at the Wauna laboratory will include a pilot plant of sufficient size to handle pressure treatment of full-length lumber items, resin impregnation apparatus, and equipment for gluing pressure-treated wood into large structural members. Plans include the enlargement of facilities for strength testing and installation of new apparatus related to evaluating the electrical resistivity of wood.

Chemicals Wanted

The following chemicals are wanted by the National Registry of Rare Chemicals, Armour Research Foundation, 33 Federal and Dearborn Sts., Chicago 16:

Benzerythrene
2,4-Dimethylpentanol
3,3-Dimethyl-n-butanol
N,N'-Tetra (carboxymethyl) ethylene diamine
Sodium butyl sulfate
Sodium amyl sulfate
Sodium hexyl sulfate
Sodium heptyl sulfate
Methyl ethyl propyl amine
Methyl ethyl butyl amine
Ethyl propyl butyl amine
3-Chloro-2-butanone
Neoamyl alcohol
Phytadiene
Di (p-biphenyl) maleate
Cupric sulfate pentahydrate, anal, reagent (35 lbs.)
β,β'-Thiodipropionic acid and dioctyl ester
4,6-Dichlororesorcinol
Barylite
Dihydroxy tetrahydrothiophenes
Ethyl dithiocarbamates
Dimethylammonium dimethyl dithiocarbamate
Dichlorosilane
Diallyl phthalate
Sodium and potassium platinous nitrites

German Fertilizer Outlook Improved

The outlook for nitrogenous fertilizers for the U. S. Zone of Germany has improved somewhat for the 1946-47 crop year, according to a report from the Military Government just released by the War Department. Indications are, it was stated, that the plants at Trostberg

and Hoechst can produce about 70 per cent of total requirements if adequate quantities of coal, raw materials and labor can be provided.

In addition, it is expected that ammonium nitrate containing about 8,000 metric tons of pure nitrogen, and representing about 8 per cent of 1946-47 requirements will be salvaged from stockpiles of captured enemy ammunition.

CALENDAR *of* EVENTS

AMERICAN COUNCIL OF COMMERCIAL LABORATORIES will hold its annual meeting at the Palmer House, Chicago, Dec. 2-3.

AMERICAN OIL CHEMISTS' SOCIETY, 20th annual fall meeting, Edgewater Beach Hotel, Chicago, Oct. 30-Nov. 1.

ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, INC., annual meeting, Hotel Sheraton, New York, Oct. 22.

CHEMICAL MARKET RESEARCH ASSOCIATION and the *TECHNICAL SERVICE ASSOCIATION* are jointly sponsoring a symposium titled "Organized Commercial Chemical Development", to be held at the Hotel Roosevelt, New York, Dec. 12.

ELECTRON MICROSCOPE SOCIETY OF AMERICA and the *AMERICAN SOCIETY FOR X-RAY AND ELECTRON DIFFRACTION*, joint winter meeting, Pittsburgh, Mellon Institute of Industrial Research and the University of Pittsburgh, Dec. 5, 6, and 7.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION, annual meeting, Hotel Traymore, Atlantic City, week of Oct. 27.

NATIONAL PEST CONTROL ASSOCIATION, 14th Annual Convention, Hotel Roosevelt, New Orleans, Louisiana, Oct. 28-30.

PACKAGING INTITUTE, eighth annual meeting, Hotel Stevens, Chicago, November 25-26.

PAINT INDUSTRIES' SHOW, in conjunction with nanual conventions of Federation of Paint and Varnish Production Clubs, and National Paint, Varnish and Lacquer Association, Hotel Claridge, Atlantic City, Nov. 4-6.

COMPANIES

Parke, Davis Begin Streptomycin Project

Parke, Davis and Company has awarded engineering and construction contracts for a new building in Detroit to house the production and development of streptomycin and other antibiotics to The H. K. Ferguson Company, industrial engineers and builders.

The four-story structure will provide office, laboratory, process and development facilities. It will be 275 feet long and 75 feet wide and will have a full basement in addition to its four floors.

Du Pont Extends Petroleum Additive Activities

The Du Pont Company has completed plans for the wide marketing, sometime in 1948, of anti-knock mixtures containtetraethyl lead for addition to gasoline. The company has been manufacturing such mixtures for the Ethyl Corporation since 1925.

In connection with the plans for expansion of its business in the whole field of petroleum additives it has appointed Ray E. Miller, formerly a vice president of the Warren Petroleum Corporation, Tulsa, Okla., as a sales director for petroleum additives in the Organic Chemicals Department, and J. J. Mikita, formerly associate research director of The Texas Company, as an assistant to J. R. Sabina, technical director of the petr leum chemicals division.

The company's petroleum chemicals division markets antioxidants, colors, metal deactivators, and color stabilizers for motor fuels, as well as antioxidants, corrosion inhibitors, fluorescing agents, and extreme pressure lubricant bases for petroleum lubricants.

Cabot Buys Carbon Black Unit

The Cabot Carbon Company, Boston, has been notified by Washington that it has been awarded the Nash carbon black plant at Guymon, Oklahoma, by the Real Property Disposal Board of the War Assets Administration. The Cabot bid for the property was $550,000.

The Nash plant produces carbon blacks by the channel process. It was built to manufacture 15,000,000 pounds of channel black a year at capacity production, but under Cabot operation the output has been at the rate of 18,000,000 pounds a year.

Profits Up for International Minerals

In making public its 37th annual report recently, International Minerals & Chemical Corporation reported net profits of $2,925,657 after all charges for the fiscal year ended June 30, 1946, as compared with $2,038,169 for the previous fiscal year.

Earnings per common share for the year were $3.92 for the 646,346 shares outstanding, whereas earnings for the previous year were $2.76 per share on 594,466 shares then outstanding.

In a letter to stockholders accompanying the report, Louis Ware, president of the company, pointed out that net sales for the year were $34,373,106, representing an increase of $4,072,016 or 13% over the previous fiscal year. Similarly, the net increase of $7,024,439 over the fiscal year ended June 30, 1944, represented an increase of 26%.

Additions to fixed assets during the year amounted to $5,324,128. The major acquisition included therein is the purchase of approximately 1,800 acres of high grade phosphate ore reserves near Bartow, Florida, at a cost of approximately $2,250,000.

Shell Develops New Solvents Series

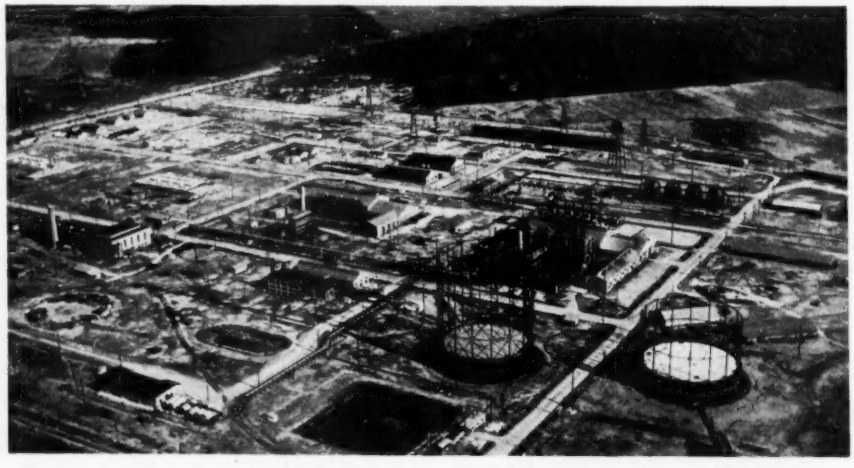
Substantial economies may be realized in petroleum refinery operations by the use of a new group of non-corrosive solvents developed by the Shell Chemical Co., according to H. G. Staaterman of that organization.

Known as sulfolanes they are now being produced commercially and are used in the petroleum field to remove sulfur and to separate various petroleum components. Their non-corrosive properties are regarded as contributory to prolonging equipment life.

Compared with many other commercially employed solvents, the sulfolanes also have the advantage of chemical inertness. They do not decompose in the presence of traces of acids and alkalies, or with sulfur. In addition, they can be removed from many mixtures by a simple water wash.

Preliminary investigations of the sulfolanes for other applications, such as the

Commercial Solvents Buys Ammonia Producer



The Dixie Ordnance Works, operated by Commercial Solvents during the war to produce anhydrous ammonia from natural gas, has been purchased by the company for $6 million. Output of the unit approximates 185 tons of anhydrous ammonia daily. It is anticipated that capacity operations will be resumed by December. Commercial Solvents plans the addition of nitric acid facilities—for use in nitroparaffin manufacture—and possible entrance into ammonium nitrate markets.

refining of vegetable oils, e. g. soybean oil, linseed oil, and tall oil, indicate them to be promising in this field.

Davison Buys Catalyst Plant

A Cincinnati, Ohio, chemical plant, built under direction of the War Production Board to increase production of 100 octane aviation gasoline, has been sold to the Davison Chemical Corp., Baltimore, Md., for $1,090,669, by War Assets Administration.

The plant was operated during the war by the Diakel Corporation, Cincinnati, for the manufacture of synthetic cracking catalyst used in high-octane gasoline production. It comprises about five acres of land on which are seven major buildings, two storage silos, eleven storage tanks, conveyors, elevators, feeders, water-treating equipment, filter systems, driers, grinding mill and other equipment.

The Davison Chemical Corp. expects to continue manufacture of catalysts.

Marathon Expands Research Facilities

Plans for a modern research laboratory building to be erected at Rothschild, Wis., to accommodate research and pilot studies on pulp, paper and chemical products have been announced by D. C. Everest, president of Marathon Corporation. The new laboratory is a unit in an expanded program of research and development to be undertaken by the company which, according to Mr. Everest, traces much of its growth in recent years to new products and processes resulting from research. The laboratory will be directed by Allen Abrams, vice president of Marathon and coordinator of company research, developments and patents. Plans call for erection of the building in 1947.

In a statement explaining the activities of the proposed laboratory, Dr. Abrams said that fundamental problems relating to Marathon's U. S. and Canadian processes and products will be the major activity of the new project. Applied research on pulp, paper and chemicals will be carried on in the new unit while applied research on converted products will be conducted at the company's Menasha, Wisconsin, laboratories.

At present extensive research is being carried on to make additional products from lignin. The Chemical Division recovers about 15,000 tons of ligneous material annually from the spent liquor remaining after cooking sulphite pulp. Currently this material is being converted into dispersing agents, water treating compounds and tanning agents, and vanillin.

Recently patents have just been granted to Messrs. Salvesen, Hossfeld and Lovin, of the company's Chemical Division, covering processes for breaking down the lignin structure by high pressure alkaline cooks. The resultant products include certain well known phenolic compounds and others which are so little known that they offer interesting possibilities for commercial development.

Lion Oil Expands Nitric Capacity

Lion Oil Company has begun construction at its Chemical Division plant near El Dorado, Arkansas, of three new forty-five-ton-per-day capacity ammonia oxidation units for the production of nitric acid. This new construction will increase present nitric acid capacity by approximately fifty per cent. Ground for foundations has already been broken at the plant and erection will proceed at once.

The new units, plus certain additional facilities to be installed, will permit the company to make nitrogen solutions, adding a new product to the company's Chemical Division.

At capacity operation the new facilities will be capable of diverting some 4,000 tons per month of present anhyrdous ammonia production into more than 9,000 tons of solutions with a nitrogen content of approximately forty per cent. The project is expected to be completed and in operation during the first quarter of 1947.

Jefferson Plans 1947 Production

Jefferson Chemical Co., Inc.—jointly owned by American Cyanamid Co. and The Texas Co.—anticipates that its Port Neches, Texas plant will be in operation by next summer, according to P. M. Dinkins, president.

Ethylene glycol and ethylene oxide are among the initial products, with plant operations based upon petroleum gases obtained from the nearby Port Arthur refinery of The Texas Co.

Eston Pilot Plants Novel Insecticide

Eston Chemicals, Inc., Los Angeles, has begun semi-plant production of hexaethyl tetraphosphate ($C_{12}H_{30}O_{13}P_4$). This material is available in limited quantities for use by insecticide manufacturers for compounding or repackaging.

It has been found to have considerable promise as an insecticide, particularly in the control of aphids and spider-mites, in dilutions ranging from 1 to 1,000 to 1 to 4000.

General Mills Brings In Lecithin Unit

The first of General Mills' four proposed soybean oil refining units began operation recently at the company's soybean processing properties at Belmond, Iowa. The unit, which removes lecithin from crude soybean oil produced at the Belmond plant by a degumming process, is under the operation of the company's Chemical Division, headed by Whitney H. Eastman, president.

General Mills' Chemical Division expects to have the three additional refining units in operation late this fall. Along with the lecithin plant, the new units will also be located in buildings adjacent to the present soybean processing plant and elevator in Belmond.

Royer Awarded Fellowship

George L. Royer, assistant director of the physical chemical section of Calco Chemical's research laboratories, has been awarded a fellowship in biological photography by the Biological Photographic Association. Dr. Royer is a 1932 Cornell graduate.

Substantial Interest Shown in Velasco

Among the seven bids received by WAA to buy or lease the $56 million, government-owned magnesium plant in Velasco, Texas, were:

Dow Chemical Co., $18,995,000 cash; J. H. A. Bowman Co., $23 million, over 20 years; G. McG. Pierce & Associates, ten year lease based on 2 cents per lb. of magnesium produced. Diamond Alkali bid only on the chlorine facilities.

It will be several weeks before the manner of disposition is decided upon.

U. S. Rubber Buys Dispersion Processes

United States Rubber Company has purchased the outstanding common stock of Dispersions Process, Inc., according to a statement by John P. Coe, vice president and general manager of Naugatuck Chemical division, United States Rubber Company.

Activities for the subsidiary, which consist of the development and sale of dispersions of rubber, reclaimed rubber, plastics and other rubber-like materials,

will be combined with the latex activities of Naugatuck Chemical division.

Dispersions Process, Inc., is a Delaware corporation, organized in 1928. It controls many patents covering methods of producing aqueous dispersions.

Casein Co. Establishes Southern Unit

The first plant for the manufacture of liquid urea resin adhesives in North Carolina has been opened at Kernersville by the Casein Co. of America, Division of the Borden Co. Its output will be sold mainly to furniture manufacturers in North Carolina and Virginia. In the past shipments to this area have been made by the Casein Co. from its Bainbridge, N. Y., facilities.

Davison Working Capital Increases

The Davison Chemical Corporation showed a substantial increase in cash assets and working capital during the fiscal year ended June 30, 1946, according to its annual report.

The statement of the company and its subsidiaries revealed cash holdings of $4,632,645 at the close of the fiscal period, an increase of $1,936,815 for the year. In addition the corporation held $806,870 in United States Treasury savings notes.

Working capital amounted to $8,697,501, as compared with $7,485,790 a year earlier, a gain of $1,211,711. Net sales for the last fiscal year totaled $23,321,238, as compared with $33,398,632 for the previous year.

Meyler Advanced By Westvaco

John deF. Meyler, midwest sales division manager of Westvaco Chlorine Products Corp., has been transferred to New York to assume the post of assistant sales manager. W. C. Hodson simultaneously became manager of Westvaco's Chicago division.

Humble Oil Builds Dewaxing Unit

The Humble Oil and Refining Company has let a contract for the design and construction of a 4600 barrel per day solvent dewaxing unit at Baytown, Texas, to E. B. Badger & Sons Co., Boston, Massachusetts.

The methyl-ethyl-ketone process, licensed by the Texaco Development Corporation, will be employed. It is anticipated that the plant will be placed in operation during 1947.

New Pigment Unit Completed

Universal Pigment & Chemical Corp., organized early this year, has completed construction of a dry color plant at Newark, N. J., and will specialize in the manufacture of organic lakes and toners.

The new organization is headed by Harold E. Weisberg, formerly with Ansbacher-Siegle Corp. and more recently director of research in Reichhold Chemicals' Color Division.

Sterling Drug Reports Peak Profits

Net profit of Sterling Drug, Inc., and subsidiary companies for the six months ended June 30, 1946, after all charges and after provision for Federal and foreign income taxes and preferred dividends, was $7,301,910, representing the highest semi-annual earnings in the company's history.

This is equivalent to $1.94 per share on 3,747,923 common shares outstanding.

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GUMS:
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GUM ARABIC BLEACHED
GUM GHATTI
GUM KARAYA (Indian)
GUM TRAGACANTH
GUM EGYPTIAN
GUM LOCUST (Carob Flour)
QUINCE SEED
★
CASEIN
SPECIALTIES:
MENTHOL (Crystals)
★
TARTARIC ACID
★
CREAM OF TARTAR
EGG ALBUMEN
EGG YOLK
BLOOD ALBUMEN
JAPAN WAX (Special)
CANDELILLA WAX

For the comparable period of 1945, net earnings, as adjusted, were $5,563,702, or $1.48 per share on 3,749,456 shares then outstanding, while for the first quarter of 1946 they were $3,822,295, or $1.01 per share.

Company Notes

The War Assets Administration has informed HERCULES POWDER COMPANY that it has terminated negotiations for the operation of the Lake Charles, Louisiana, ammonia plant without reaching an agreement. Hence, Hercules will not operate the unit, according to company officials.

A Sparrows Point, Md., war plant, capable of producing 67,200,000 cu. ft. of oxygen per year, has been sold to the DELTA CHEMICAL MANUFACTURING CO., Baltimore, for $125,000 by War Assets Administration.

It was operated during the war by Air Reduction Sales Co.

INDUSTRIAL POWDERS, INC. announces completion of its installations at 220 Essex Street, Brooklyn, New Work. The firm is equipped for the production of electrolytic copper and copper oxide powders for all metallurgical uses, and for the paint, electrical, plastics, chemical, and automotive industries.

The formation, on October 1st, of a new company, located at 52 Vanderbilt Avenue, New York 17, N. Y., specializing in pigment and chemical sales and technical service, is announced by Robert I. Webber and Holland W. Smith, Jr.

The new organization will be known as WEBBER & SMITH, and will handle the same type of products as the partners previously dealt in individually.

B. F. GOODRICH CHEMICAL COMPANY, Cleveland, Ohio, has established a new sales office in the United Shoe Machinery Company Building, 140 Federal Street, Boston. W. D. Lahey and J. J. Breen will be sales representatives for Geon thermoplastics in Boston and New England.

THE SCHERING CORPORATION, manufacturer of pure hormone and other pharmaceutical products, Bloomfield, N. J., has entered the penicillin field with the introduction of special oral tablets of penicillin calcium.

J. J. Press, vice-president of MANUFACTURERS RESEARCH LABORATORIES, Inc., Jersey City, N. J., announces the formation of a new department to service the essential oil, perfume and synthetic aromatic chemical trades.

MAAS & WALDSTEIN Co., Newark, N. J., manufacturers of specialized production finishes, has acquired the Smith-Davis Paint Co., 10751 Venice Boulevard, Los Angeles 34, California.

Purchase of SMITH & ALLER, LTD., west coast distributors of Du Pont motion picture film for approximately 20 years, has been announced by the Du Pont Company. The purchase was effected September 16.

G. S. ZIEGLER AND COMPANY, New York City, processors of stearine pitch, gilsonite and waxes, has been appointed to act as sales representative for the Chemi-

International's Mammoth Phosphate-Mining Drag-line

Almost 4 million pounds of overburden per hour are excavated by this huge drag-line at the Peace Valley Phosphate operation of International Minerals & Chemical Corp., Mulberry, Fla. It can dig to a depth of 130 feet and then carry the 32 ton rock load 420 feet to the dumping spot. Each cycle requires but one minute.

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- Oxyquinoline Sulfonic
- Para-Aminobenzoic
- Phenylacetic
- Uric

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Alpha Alanine
Betal Alanine
Aluminum Isopropylate
Benzaldehyde
Benzil
Benzyl Cinnamate
Calcium Succinate
Diacetyl
Diiodotyrosine
Ethyl Malonate
Guanidine Carbonate
Guanidine Hydrochloride
Guanidine Sulfate
Hydroquinone
Lithium Succinate
Methyl Iodide
Oxyquinoline
Phenylacetamide
Phenylacetone
Phenylmethyl Pyrazalone
Potassium Cyanate
Saponin
Sodium Parahydroxyphenyl Arsonate
Tryptophane
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cal Division of General Mills, Inc., in metropolitan New York and upper New York state excluding Buffalo; northern New Jersey, excluding Trenton; Connecticut west of the Connecticut River; and Wilmington, Delaware.

GENERAL CHEMICAL Co., a subsidiary of Allied Chemical and Dye Corp., has a new aluminum sulfate producing plant under construction on a six acre site near Johnsonburg, Pa. A major share of output will be channeled to adjacent paper mills.

Part of the Victory Ordnance Plant, Decature, Ill., has been sold to GENERAL ELECTRIC Co. for $650,000. The company plans to use the facilities for the production of laminated plastics.

SOLVAY PROCESS Co., subsidiary of Allied Chemical and Dye Corp., has purchased the government-owned nitrogen plant at South Point, Ohio. It is now being operated by Solvay for the production of ammonia and ammonium nitrate solutions.

THE CALCO CHEMICAL DIVISION, AMERICAN CYANAMID COMPANY, Bound Brook, N. J., announces that the new office of the Chicago branch of its Pigment Department, has been moved to 228 North LaSalle St., Chicago 1, Illinois.

Stockholders of AMERICAN VISCOSE CORPORATION have approved increasing the authorized common stock of the company from 2,000,000 to 2,500,000 shares and the acquisition of the assets of Sylvania Industrial Corporation.

WELCH, HOLME & CLARK Co., INC., has moved from 563 Greenwich St., New York, to 439 West Street, New York. The new telephone numbers are: Chelsea 3-6048, 6049, 6050, and 6051.

HEYDEN CHEMICAL CORP. announces the opening of a sales and business office at 1700 Walnut Street, Philadelphia.

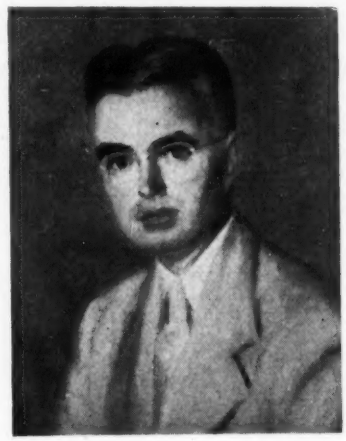
PHILIPP BROTHERS CHEMICALS, INC., announces that its offices have been moved from 70 Pine St., N. Y. 5, N. Y., into new larger quarters at 37 Wall Street, New York 5, N. Y.

The offices of KERMIN, THALL, AND LAVELLE, formerly Kermin-Thall, have been moved to 222 Fourth Ave., New York.

MICHEL EXPORT Co., 90 Broad St., New York, has changed its corporate name to M. Michel & Co., Inc.

As part of an extensive expansion program, DALLAS LABORATORIES has acquired a long-term lease on a three-story building formerly occupied by General Tire & Rubber Co. at 2500 S. Ervay St., Dallas, Texas. The laboratory organization, under the direction of Helman Rosenthal, has four major divisions; chemical analysis and research; chemical engineering; bacteriology and sanitation; labeling and patents.

Talbot to Direct Stanford Research



W. F. Talbot, formerly technical director of Sun Chemical Corp., New York, who has been appointed director of Stanford Research Institute which is being established at Stanford University, Cal. The new organization is designed to integrate various research functions of interest to industry on the Coast.

PERSONNEL

Routh Heads Alkali Advisory Group

E. E. Routh, vice president, Mathieson, Alkali Works, Inc., New York city, has been elected chairman of the industry advisory committee for the chlorine-alkalies industry, the Office of Price Administration announces.

C. R. Fay, comptroller, Pittsburgh Plate Glass Co., Pittsburgh, and W. A. Crichley, controller, Diamond Alkali Co., Pittsburgh, have been elected vice chairman and secretary respectively.

The committee, which held its initial meeting Sept. 23 in Washington, D. C., has been appointed to advise OPA on price ceilings and decontrol for chlorine, caustic soda and soda ash.

Dupont Transfers Research Personnel

Three changes in Du Pont research personnel are announced by E. B. Middleton, director of research of the company's Photo Products Department.

Emery Meschter, who has been a group leader in the Parlin Research Laboratory, has been appointed laboratory director of the division's research laboratory at Towanda, Pa. Frank E. Swindells, pres-

ent laboratory director at Towanda, is being transferred to the Parlin Laboratory on special assignment, and J. Paul Weiss has been named to take over Dr. Meschter's work as group leader at Parlin.

Celanese Promotes Fennebresque and Jackson

Recent executive appointments in the Chemical Division of Celanese Corporation of America include the advancement of J. D. Fennebresque to the position of general manager, with W. Ward Jackson named sales manager.

Prior to joining the Celanese organization in October, 1944, Mr. Fennebresque was variously assistant to the Chief of the Development Branch of the Office of Rubber Director, with Monsanto Chemical Company, the War Production Board, and, during the war, a member of the Joint Technical Industrial Intelligence Committee.

Mr. Jackson has been with the Celanese Plastics Division since 1931 and recently has been in charge of the Product Application Division in the plastics field.

A. I. F. A. Elects Directors

Four additions were announced to the board of directors of the Agricultural Insecticide and Fungicide Association, following its 13th annual meeting in Spring Lake, N. J.

The four are W. C. Bennett, president of Phelps Dodge Refining Corp.; James McConnon, vice president of McConnon & Co., of Winona, Minn.; E. H. Phillips, vice president in charge of purchasing for Cooperative G. L. F. Soil Building Service, New York, and Fred G. Shaneman, of Tacoma, Wash., vice president of Pennsylvania Salt Manufacturing Company.

Collins Heads Pennsalt Market Research

The appointment of George T. Collins as manager of the Market Research Department of Pennsylvania Salt Manufacturing Company has been announced by Richard L. Davies, assistant to the president. Mr. Collins, formerly a chemical engineer in the department, was assistant manager of Market Research when he was promoted. He joined the Pennsalt organization October 15, 1943.

Research Men Join Emery Industries

Two veterans of World War II have joined the Emery Industries, Inc., organization, A. W. Schubert, vice-president of the Cincinnati firm, announced recently.

New director for Emery's research on plasticizers, resins and surface coatings is Robert Van Tuyle, for four years in charge of research on fabric coatings for the Chemical Warfare Service at Massachusetts Institute of Technology.

E. R. Baker, formerly assistant chief of the Technical Division for Research and Development of the Chemical Warfare Service, has joined Emery's staff to head the newly created Development Department which was established to improve and extend the use of all its products, including several as yet in the pilot-plant stage.

Wood Advanced to Engineering Post

The Du Pont company announces the appointment of Melvin F. Wood as assistant chief engineer. He succeeds Granville M. Read who became chief engineer with the retirement of Everett G. Ackart recently.

Mr. Wood has been manager of the design division of the Engineering Department since 1945 and has been with Du Pont since 1928.

Pennsalt Advances Abbott

Frederick C. Abbott, formerly manager of the New Products Division, has been named assistant production manager in the Manufacturing Department of the Pennsylvania Salt Manufacturing Company, it was announced recently. He reports to C. S. Beldin, production manager.

Hugh Richard Bishop, recently released

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as a lieutenant colonel in the air forces after four years of service, has been named manager of the New Products Division, replacing Mr. Abbott. Martin E. Johnson has been transferred from the Market Research Department to the New Products Division.

Hansch Receives Research Grant

Corwin H. Hansch, assistant professor of chemistry at Pomona College, Claremont, Calif., has been awarded $2310 by the Research Corporation, New York, N. Y., to conduct a research project in catalytic synthesis of indoles and thianaphthenes on a Frederick Gardner Cottrell special grant-in-aid for one year, the college has announced.

While not intended to produce "immediate practical results," Dr. Hansch said, the project "will be an attempt to develop new and more effective means of synthesizing these classes of products.

Bayer Promotes Shafer

Appointment of Judson B. Shafer as assistant sales manager of the Bayer Company Division, Sterling Drug, Inc., is announced by Stanley I. Clark, vice-president and general sales manager.

Mr. Shafer has been associated with Sterling since May 1941. Prior to the war he was connected chiefly with the Bayer foreign department.

Initiate Manufacture of Novel Anti-Malarial

A. E. Sherndal (right), vice-president of Winthrop Chemical Co. Inc., presents one of the first bottles of Aralen tablets made commercially to Alexander Surrey, chemist of the Sterling-Winthrop Research Institute. Dr. Surrey was the first U. S. chemist to synthesize this new anti-malarial. Chemically it is 7-chloro-4(4-diethylamino-1-methylbutylamino) quinoline diphosphate.

Wallace Forms Chemical Export Concern

Russell A. Wallace, formerly in charge of plastic and chemical exports for the Celanese Corp. of America, has resigned to become a partner in the firm of Dussi-Wallace & Co., New York.

The newly formed partnership will specialize in the export of chemicals and plastics to southeastern Europe, the Near East, and Latin America.

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Little Joins Ellicott Laboratories

Robert W. Little, now on terminal leave from the Army, has joined Ellicott Laboratories, Lawrenceville, N. J., as director of research. Until recently Major Little was serving with the Research and Development Branch, Office of the Quartermaster General, conducting a research program on the flameproofing of cotton fabrics.

He will continue such work with the Ellicott organization in the development of textile flameproofing and mildewproofing compounds.

Personnel Notes

Recent additions to the research staff of The New York Quinine & Chemical Works, Inc. include HOWARD BINDELL, formerly with S. B. Penick & Co., MANUEL BAIZER, General Chemical and OSCAR GAWRON from American Home Products.

E. W. THOMPSON, who has been manager of the Louisville neoprene synthetic rubber plant, which the Du Pont company built and is operating for the government, has been appointed production manager of the Rubber Chemicals Division of Du Pont. He assumed the position, a new one in the Organic Chemicals Department, on October 1.

R. J. BAUMANN has joined the market research division of the chemical products department of Standard Oil Company (Indiana). Mr. Baumann received his master's degree in chemistry from the University of Illinois, and has had laboratory and production experience with the Sherwin Williams Company, the American Aniline Products, and the Barrett Company.

H. O. KUNG, formerly editor & publisher of The Science Monthly, Ltd., now general manager of China Export & Import Co., Tientsin, will visit the United States early next Spring.

Appointment of Edmund D. Kennedy as sales promotion manager of Monsanto Chemical Company's Plastics Division is announced by F. A. Abbiati, general sales manager.

I. G. Nadel has been appointed to the staff of MANUFACTURERS RESEARCH LABORATORIES, INC., Jersey City, N. J. He was formerly research chemist with the Celanese Corporation of America and chief chemist of Martin Laboratories, manufacturers of thioglycolic acid and derivatives.

FREDERICK W. SMITHER, chemist at the National Bureau of Standards since 1914 and authority on the analysis of soaps and other detergents, retired recently after 39 years of continuous Government service. Mr. Smither has been chief of the Section on Detergents and Miscellaneous Materials for 22 years.

JOSEPH H. FULMER, formerly connected with the Ethyl Corporation and Sharples Chemicals, has joined the Engineering Department of Pennsylvania Salt Manufacturing Company. Mr. Fulmer graduated from Bucknell University as a chemical engineer.

FRANCIS J. CURTIS, vice-president of the Monsanto Chemical Company, St. Louis, has been elected chairman of the Division of Industrial and Engineering Chemistry of the American Chemical Society for 1946-47. He succeeds Thomas H. Chilton, director of the technical division of the engineering department at the E. I. du Pont de Nemours & Co. experimental station in Wilmington, Del.

M. E. FINE, Minnesota '43 and F. J. SCHNETTLER, M. S., Columbia '41, formerly with the Manhattan District Project at Los Alamos, New Mexico, have become members of the technical staff of the Chemical Laboratories, Bell Telephone Laboratories, Murray Hill, New Jersey.

BRUCE A. GUSTIN, JR. has been appointed district manager of the Charlotte Office of Carbide and Carbon Chemicals Corporation, according to an announcement by company officials.

J. V. STROUTS has been promoted to manager of General Mills' Special Commodities plant at Keokuk, Iowa. it is

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FACTORIES AT CLIFTON, N. J. AND GRILLARS (YARI) FRANCE

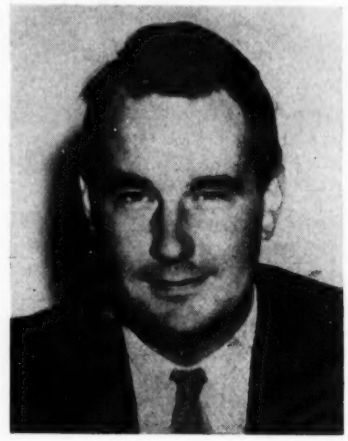
WRITE FOR DETAILS

announced by B. M. Hagan, vice president and general manager of the company's Special Commodities Division. He assumed his new responsibilities October 1.

The Hooker Electrochemical Company has appointed JOHN D. RUE as works manager of its Tacoma plant.

Mr. Rue has been associated with the Hooker Company since 1931. Prior to that time, he was in charge of the Pulp and Paper Section of the U. S. Forest Products Laboratory at Madison, Wisconsin.

Dersch Rejoins Calco Chemical



John W. Dersch, named to the post of project engineer of the Marietta Works, Calco Chemical Division, American Cyanamid Co. He was previously project engineer with the Brown Co., Berlin, N. H.

DAVE WETHERLY, chemical engineer who participated in a supervisory capacity during the design and construction program at the Oak Ridge, Tenn., atom bomb plant, has been named contract engineer for the eastern district by The H. K. Ferguson Company, industrial engineers and builders.

DONALD C. OSKIN, who joined Westvaco Chlorine Products Corporation, New York, late last year after serving for four years as a major on the staff of General Doolittle, has been made resident manager of the recently opened Westvaco office at 1900 East Jefferson Street, Detroit 7, Michigan.

ORVILLE J. SWEETING, now teaching organic chemistry as an assistant professor at Cornell University, has been appointed to the position of assistant professor of chemistry at the University of Colorado.

J. J. PRESS has been appointed director of textile research of the Manufacturers Research Laboratories, Inc., Jersey City, N. J. Mr. Press was assistant research director at the research laboratory of the

Virginia-Carolina Chemical Corporation and previously had been in charge of research on textiles proteins, and synthetic fibers at the Ford Motor Company.

F. M. Rogers, chief chemist of the Whiting Laboratories, Standard Oil Co. (Indiana), retired last month.

M. M. Teisch, formerly with the Ore & Chemical Corp. as manager of the company's chemical department, has joined Metal Traders, Inc., Wall Street, New York.

Leonard T. Beale, president of the Pennsylvania Salt Manufacturing Company, and Richard L. Davies, assistant to the president of Pennsalt, have received from King Christian X of Denmark the King Christian X Medal of Liberation for their efforts for the Danish cause during the years of Nazi occupation.

Albert E. Marshall, president of the Rumford Chemical Works, Rumford, R. I., has been elected chairman of the American Chemical Society's Rhode Island Section. Mr. Marshall is a former president of the American Institute of Chemical Engineers and a former chairman of the Society of Chemical Industry.

Emil D. Ries, director of sales of the Du Pont Ammonia Department, has been appointed assistant general manager of the department, it is announced by Walter Dannenbaum, general manager.

Carlyle John Stehman of the Central Research Department of the Monsanto Chemical Company, Dayton, Ohio, has been elected chairman of the American Chemical Society's Dayton Section. He succeeds John W. Wright of Dayton.

Velsicol Corporation announces the appointment of Noble L. Mooneyham as western district sales manager for the company. His connection with Velsicol began in 1935 and he has served in an executive capacity since 1938.

Ralph W. Feil, a graduate of the University of Virginia has joined the staff of the Institute of Textile Technology to work in the engineering division.

L. Kent Wyatt has been appointed assistant district sales manager in the Detroit office of the Grasselli Chemicals Department, the Du Pont Company announces.

Sydney L. W. Lea, recently released from active duty as an Army captain, has been named manager of advertising of the Pennsylvania Salt Manufacturing Company.

Coordination of industrial relations activities for the Naugatuck Chemical and Synthetic Rubber Divisions, United States

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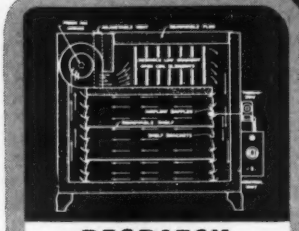

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Rubber Company under WILLIAM E. BRADFORD as service manager is announced by John P. Coe, vice president and general manager of the divisions. He will make his headquarters at the synthetic rubber plant operated by the company at Naugatuck, Conn.

Slater Appointed Schwarz Chief Chemist

Richard R. Slater, appointed chief chemist of Schwarz Laboratories Inc., New York. He was previously associated with the Material Laboratory of the New York Naval Shipyard, holding the rank of lieutenant commander.

The return of V. F. HRIBAR to his position as chief chemist of the American Lumber and Treating company after 36 months of duty with the Navy has been announced by F. W. Gottschalk, technical director.

ORVILLE O. KENWORTHY, until recently with the Chemical Warfare Service Branch, U. S. Army, has been added to the staff of the Color Division of Ferro Enamel Corporation, Cleveland, Ohio. A former Lieut. Colonel, Mr. Kenworthy will engage in research and development work in the field of inorganic coloring materials for glass, pottery and plastics.

C. B. HARSTON, agricultural chemist, has been named to the staff of Battelle Institute, Columbus, Ohio, where he will participate in a program of research on the effects of metals on soils.

EDWARD F. WESP, assistant director of viscose rayon research at the Spruance plant of E. I. du Pont de Nemours & Company, Richmond, Va., has been appointed technical superintendent of the Yerkes rayon plant at Buffalo, N. Y., it was announced recently. Dr. Wesp will be succeeded at Richmond by Emerson A Tippetts.

EDWARD W. LANG, chemical engineer, and SABERT OGLESBY, JR., electrical en-

gineer, who were recently released from the Armed Forces, have joined the staff of Southern Research Institute.

Recent additions to the staff of Arthur D. Little, Inc., Cambridge, Mass., industrial research organization, include DANIEL REID WEEDON, JR., packaging specialist; COLIN C. REID, organic chemist; GEORGE P. FULTON, biologist; and GARVIN BALDWEN, JR., market analyst.

R. W. MASON, JR., formerly associated with The Lithium Company, Newark, New Jersey, has joined the Development and Research Division of The International Nickel Company, Inc.

Smyth Returns to Magnus, Mabee & Reynard

Henry J. Smyth, with the Export Department of Magnus, Mabee & Reynard until he entered the Army four years ago, has rejoined the company and will be headquartered in Chicago. Mr. Smyth has been active in both sales and market research fields.

J. K. STEVENSON, manager of the Detroit office of Givaudan-Delawanna, Inc., has been released from active duty in the United States Army Air Forces and has returned to his position with the Givaudan organization.

THOMAS O'SHAUGHNESSY, a research chemist in the pioneer research section, Rayon Division of the E. I. Du Pont de Nemours Company in Buffalo, has been appointed Assistant Professor of Physical Chemistry at the Polytechnic Institute of Brooklyn.

NEWS *of* SUPPLIERS

Appointment of Raymond H. Van Saun as manager for its Mexico City plant is announced by the directors of Rheem de Mexico S.A. who operate the new company in cooperation with Rheem Manufacturing Company.

Mr. Van Saun presently is in the United States to arrange for the shipment of machinery for the new factory now rising at Tlalnepantla, an industrial suburb of Mexico City. Produc-

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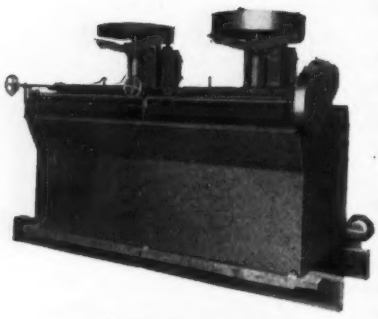

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The advantages of this machine are: (1) Greatly increased aeration; (2) More air per unit of power input; (3) Better diffusion and more uniform distribution of air; (4) Remarkable ability to increase aeration with feed overloads; (5) Easier servicing; (6) Increased life of parts.

The basic improvements in flotation performance of this machine hinge upon the fact that air and pulp are introduced separately instead of together. The Massco-Fahrenwald Flotation Machine was designed by Dr. A. W. Fahrenwald, one of the world's topmost authorities on ore beneficiation by flotation.

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tion of steel shipping containers, water heaters, and space heaters for the Mexican market is scheduled for the third quarter of this year.

The Komline-Sanderson Engineering Corporation has been formed for the purpose of developing and marketing machinery and equipment for the treatment of sewage and industrial wastes. Partners in the concern are Thomas R. Komline and Walter H. Sanderson, both recently released from the Army.

Arrangements have been made with the Instant Drying Corporation for use of the basic patent on the spray-drying of sewage sludge.

Albert M. Kahn, president of **The Acme Rubber Manufacturing Company** and of the Hamilton Rubber Manufacturing Corp. has announced the merger of these two companies to form the new Acme-Hamilton Manufacturing Corp., a Delaware Corporation, with main offices at Trenton, New Jersey. The officers of the new Acme-Hamilton Manufacturing Corp. are Albert M. Kahn, president, A. J. Kaminsky, executive vice-president and treasurer, Peter Jenkins, vice-president, Charles J. Gale, Secretary. Mr. Kahn is also president of Consolidated Products Co., used machinery dealers, New York.

H. K. **Porter Company, Inc.**, has announced the purchase of the business of the American Spiral Spring and Manufacturing Company of Pittsburgh. The new acquisition, together with the present Porter Fort Pitt Spring plant, will be operated as American-Fort Pitt Spring Division of H. K. Porter Company, Inc.

The International Nickel Company, Inc. announces the opening of a Texas Technical Section of its Development and Research Division, which is located in the Bankers Mortgage Building, Houston, Texas. It will furnish to industry technical information and assistance relating to alloys containing nickel. The Section's activities will cover the States of Texas, Oklahoma, Louisiana, Mississippi and the southern half of Arkansas.

John R. Cassell Co., Inc., 110 W. 42nd St., New York 18, N. Y., has been appointed exclusive manufacturer's distributor in the United States and Canada for the "Instrumaster" line of mechanical drawing accessories made by Instrumaster Industries, Inc., 73 Arch St., Greenwich, Conn.

The **National Radiator Company** has purchased the Pullman-Standard Car Company plant at Middletown, Pennsylvania, it is announced by Robert S. Waters, president. The plant will fabricate steel boilers for industrial and domestic purposes, pressure vessels, heat exchangers and other industrial products, formerly made at the firm's Lebanon unit.

The Daniel Adamson & Co., Ltd., of Dukinfield, Cheshire, England, will manufacture the complete heat transfer equipment line of the Alco Products Division, American Locomotive Company, it is announced by President Robert B. McColl. Under the terms of the affiliation, the English company, which has over 103 years of experience in the manufacture of Turbo Plant boilers of all types, including shell and water tube, pressure vessels, spun heads and similar equipment, will establish a division to produce Alco Products equipment. In making the announcement, Mr. McColl said that the Alco Products Division of American Locomotive will do all engineering and designing.

Hammond Manufacturing Corporation is the new name of the Pacific Fabricating Company, incorporated February 1, 1946. D. C. Hammond continues as president, retaining ownership of all stock. The firm accepts blueprints of products and furnishes quotations for volume production. Facilities include complete plant equipment for the fabricating of light and heavy metal units. Manpower, assembly and shipping, and marketing facilities are offered to assist in developing West Coast manufacture.

Everett C. Gosnell, formerly manager, Chemical Division of Lukens Steel Company and subsidiaries, has joined **The Colonial Iron Works Company**, Cleveland, as manager, Chemical and Process Equipment Division. Mr. Gosnell was born in West Terre Haute, Indiana, and received his Bachelor of Science degree in chemical engineering from Rose Polytechnic Institute in 1925. He also received a Master of Arts degree in chemistry and metallurgy from Indiana University in 1927.

The International Nickel Company, Inc., announces the opening of the Empire State technical section of its Development and Research Division. It will be located in the Genesee Valley Trust Building Exchange and Broad Streets, Rochester 4, New York, and will furnish technical information and assistance to industry in the State of New York excluding New York City, the Albany area, and the Hudson River Valley.

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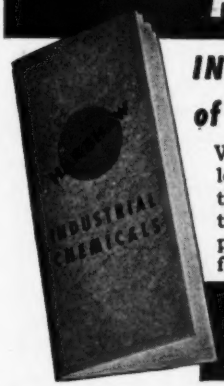

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CHEMICAL SPECIALTIES NEWS

Du Pont Plans Major Specialty Expansion

A plant to cost approximately a million dollars for the manufacture of Du Pont chemical specialties, including such automotive maintenance products as polishes, waxes, cooling system cleaner, sealer and rust inhibitor, will be built at West Toledo, Ohio.

The new project will be located on the same site as the company's present finishes plant. It will be a two-story structure providing manufacturing, office and warehouse facilities.

Among the packaged products to be produced are: household cement, cleaning fluid, refrigerator polish, chrome and metal polish, hand protective cream and several specialties being developed. Construction will begin when government authorization is received and materials are available.

Sherwin-Williams Broadens Specialties Distribution

Sherwin-Williams Co. announces that its two new nonpaint specialties, Weed-No-More (2,4D) and Pestroy (DDT), will be sold through drug, department, and grocery stores and other suitable retail outlets, as well as through hardware and other stores which have Sherwin-Williams paint franchises.

Another departure in the company's distribution policies is that the new products will be sold also by its six wholly owned subsidiaries, Acme Lead & Color Works, W. W. Lawrence Co., Lowe Brothers Co., John Lucas & Co., Inc., Martin-Senour Co., and Rogers Paint Products, Inc.

This year the company's nonpaint specialties are expected to account for 25% of its sales.

Marietta Acquires Western Subsidiaries

American-Marietta Company, paint manufacturer, Chicago, has purchased the Pacific Chemical Company, Los Angeles, and the Adhesive Products Company, Seattle, Wash.

Pacific Chemical, organized in 1920, manufactures insecticides and cleaners for the industrial and automotive trades, and Adhesive Products, formed in 1932, makes adhesives and synthetic resin for the manufacture of plywood.

Extend Lithcote Marketing Plans

Sales of Lithcote (corrosion-resistant coating and lining material) have been taken over by Bedford Development Corporation, 230 Park Avenue, New York, representing Lithgow Corporation of Chicago. Bedford plans to extend the application of Lithcote, a multiple-coat, non-vitreous enamel-like finish, in fields where corrosion of equipment is an important impediment to production.

Additional to its use on pulp and paper mill equipment, it has been successfully applied to food processing equipment, pharmaceutical tanks, distillery process and storage equipment, brewery tanks, wine tanks and tank cars, petroleum tanks, packing house equipment, chemical tanks, tank cars and equipment.

Tracey Rejoins Permutit

John C. Tracey, formerly Lt. Col. of U. S. Army engineers, has joined Permutit Co. as a water-conditioning engineer. He will be stationed in Washington, D. C.

Water-Resistant Label Adhesive

Cooler-Proof is the trade name given the new semi-ice proof bottle label machine glue recently introduced by Paisley Products, Inc., Chicago.

Cooler-Proof is described as a "jelly" glue. It is reddish brown in color, odorless, and supplied to the trade in proper body making it ready-to-use in the gum pot. The jelly charact-- of the glue provides a tough, flexible, non-crystallizing glue film that withstands considerable water immersion and resistance to the damp atmosphere of refrigerators and ice boxes.

Norwich Embarks on Expansion Program

Construction has been started recently on the first units in a long-term building program which will ultimately give the Norwich Pharmacal Company more than 650,000 square feet of space in a single, modern, integrated plant.

M. C. Eaton, president and general manager of the company, states that work on a five-story and basement administration building, and a five-story and basement extension to the manufacturing and packaging building are proceeding, following approval by the Civilian Production Administration. A total of 235,000 square feet will be provided in these buildings.

The Austin Company, whose engineers recently completed a survey of the company's long-term needs, is handling the design and construction work.

Novel Brass Cleaner

Enthone, Inc., New Haven, Conn., is now marketing a new alkali cleaner called Enthone Brass Cleaner.

This cleaner is stated to have high detergent ability and, in addition, has no tarnishing action on active metals including copper, brass, bronze, nickel silver, tin and lead. It can, therefore, be used as a general plating room cleaner for cleaning of steel and the metals listed. It has high detergent qualities for soak or electrolytic cleaning and it can also be used for scrub cleaning because it does not contain strong alkalis.

A feature of the cleaner is the long life during operation due to stable surface active materials and buffered alkali balance.

Timing of DDT Application Important

DDT should not be applied to seed alfalfa while it is in bloom, because of the danger of poisoning bees, the United States Department of Agriculture warns. Reports received by the Department indicate that DDT may have been responsible for severe injury to honeybees where growers have applied it to seed alfalfa that was in full bloom.

If seed alfalfa is treated with DDT for control of Lygus bugs the dust should be applied while the flowers are in the bud stage and before many of them have opened. In field trials in Utah and Arizona a single application of dust containing 10 per cent of DDT in pyrophyllite, talc or other suitable carrier at the rate of 20 pounds per acre when or just before the first flowers begin to open has given good protection of the crop against Lygus bugs, leafhoppers, alfalfa weevil, aphids and thrips. If applied at that time and rate no injury to bees has been detected and profitable increases in seed yields have been obtained.

According to the Bureau of Etymology and Plant Quarantine, the chaff and straw from DDT-treated alfalfa seed should not be fed to livestock. More information is needed on the residues of DDT present in the threshings and their direct or in-

direct toxic effects on livestock and man. Pending further information on residue hazards DDT insecticides should not be used on alfalfa that is to be pastured, or cut for hay, meal, or silage.

Alkyd Resins Used in Phonograph Records

A special alkyd resin is an important ingredient of a composition for the production of tough, flexible, abuse-resistant phonograph records.

According to the specifications of U. S. Patent 2,403,448, granted to J. S. Massarene, compositions for this purpose consist of mixtures containing from 25 to 50 per cent of thermoplastic cellulose aceto-propionate; 15 to 30 per cent of an appropriate plasticizer for the aceto-propionate; 24.75 to 45 per cent of a resin comprising glycerine phthalate modified with benzoic acid, and 1 to 4 per cent of a hard wax.

Water-Resistant Rubless Polish

A laboratory tested formulation for water-resistant rubless polish is listed as having the following composition:

Carnauba wax #1—40.0 lbs.
Oleic Acid—8.0 lbs.
Triethanolamine—4.0 lbs.
Potassium Hydroxide—0.5 lbs.
Water—240.0 lbs.

Basic steps in compounding, which may require slight modifications to meet individual requirements, are:

1. Melt carnauba and oleic acid together and bring temperature to 95 Cent.
2. Dissolve the potassium hydroxide in about an equal weight of water heated to 95 Cent. Add this hot solution and triethanolamine to the wax melt and stir until clear.
3. Add the rest of the boiling water quickly, all at one time, and stir continuously until the wax solution is completely dispersed in the water.

A shellac dispersion, composed of shellac (bleached, dewaxed) 3.5 lbs.; ammonia (28 per cent), 0.5 lbs.; and water, 32.0 lbs. may be added as step 4, if desired.

Wyeth Makes Novel Serum

The Russian-originated serum, ACS, which it is claimed may increase the life span to 150 years, is now being produced on a small scale by Wyeth, Inc., Philadelphia.

At present being investigated clinically, none is available for experimental or other purposes.

Market Insecticide For Laundries

Noting the fly problem with which laundries and dry cleaning establishments are faced as a result of the volume of soiled clothing handled, Pennsylvania Salt Manufacturing Co. has recently begun to market a DDT product to this trade.

Trademarked Erusto DDT Emulsion, the insecticide contains 34 per cent DDT and 66 per cent inert ingredients. It is sold in one gallon jugs, and may be diluted with water for use.

New Crackle Type Lacquer

A new lacquer enamel which air dries to prism-like formations has been developed by Maas & Waldstein Company, Newark.

The coating, which is named Prismlac, is said to produce unusually attractive crystallizations on glass, steel, aluminum, brass and copper. It can also be used on closed grain wood, such as birch and maple.

Market Novel Automobile Finish

A new paint job on any automobile that can be applied with a piece of cheesecloth is the claim made by the Tiz-nu Corp., Los Angeles, for its brushless auto paint. The finish is said to dry in an hour, will not peel or crack, and can be waxed or polished within a week of re-finishing.

Babbitt Shifts Executive Responsibilities

Leon Mendleson has retired as president of the B. T. Babbitt, Inc., manufacturer of soap products, New York, and has been succeeded by Alan Mendleson, formerly executive vice-president.

In addition, Alton Mendleson has been named vice-president in charge of manufacturing, and Samuel Mendleson chairman of the board and executive vice-president. L. J. Gumpert has been named vice-president in charge of sales, and John E. Sammond has been elected treasurer.

California Chemical Buys New Plant

The California Chemical Spray Corporation, Richmond, Cal., has purchased the former main syrup plant of the Sun-Maid Raisin Growers Association in Fresno, Cal., for approximately $125,000.

The building will be used by the chemical company as a warehouse and manufacturing plant for the firm's San Joaquin Valley operations.

Unique Use of DDT

A novel method of using DDT to kill flies, moths, mosquitoes and other flying pests is being exploited by DDT Lite Inc., Los Angeles.

The company is now impregnating flocking with the insecticide, attaching the flocking to a wire skeleton and the screen of a light globe. In practice the light attracts insects so that they come in contact with the DDT.

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CANADIAN NEWS

New Oil Processing Plant

Edible Oils Limited, a new Canadian company, is erecting the fourth vegetable plant in the Dominion, located in the former Canada Starch Co.'s waterfront premises at Fort William, Ont. The factory, previously a munitions plant, can process about 30,000 tons—just over a million bushels of flax, sunflower, mustard and rape seed a year—to yield at least 8000 tons of oil.

A chemical and solvent process similar to that of Victory Mills, Limited, Toronto will be installed. This process extracts practically the total oil content to leave a residue of less than 1% as against between 4 and 5% after the "expelling" process carried on in the two smaller western plants.

Extraction equipment is being imported from the dismantled Henry Ford, Dearborn, Mich., seed oil plant. Production is slated to start before the new year.

Standard to Make Carboxymethylcellulose

Standard Chemical Co. Ltd., major Canadian producer of wood distillation chemicals, is at present converting part of its Longford, Ont., unit for the production of carboxymethylcellulose. It is expected that operations will be initiated later this year to provide the Dominion with its first domestic source of this chemical.

Hitherto Canada has been dependent mainly upon the U. S. A. for its limited needs of this chemical—used mainly by paint and textile industries. It is reported that Standard Chemical will use a Swedish process, differing in some respects from the U. S. technique.

Chemical Imports From U. S. A. Rise

Imports of chemicals and allied products from all countries for the month of June totalled $7.5 million as compared with a total of $6.6 million for the same month in 1945. The six month total ending June 1946 was $46.8 million, up substantially over the same period in 1945 which was $39.4 million. Totals for 1946 should show a marked increase over the year 1945 during which imports were valued at $79.7 million.

The United States continued to supply approximately 90% of the dollar total with imports from that source for June amounting to $6.6 million as compared with $5.8 million for June 1945. The six months total of imports from the U. S. A. was up $7⅛ million over the same period of 1945, the respective sums being $42.2 and $35.5 million. The United Kingdom supplied the major share of the balance of imports, the totals for June 1946 and 1945 being $0.6 million and $0.5 million. The six month aggregate for 1946 was $2.7 million, an increase over the same period of 1945 during which incoming shipments totalled $2.3 million.

Exports of chemical and allied products to all countries were almost halved in June in comparison with the same month in 1945, the respective totals being $5.1 million and $9.8 million. This downward trend will result in exports for 1946 being considerably below the 1945 total.

Calco Moves Into Canadian Market

North American Cyanamid Ltd., affiliate of American Cyanamid Co., New York, has recently formed a Canadian subsidiary under the corporate title of Calco Chemical Division. Offices and warehouses have been opened in both Montreal and Toronto the main functions of which will be to distribute Calco's line of dyestuffs, chemicals and intermediates.

Cyanamid's move, coupled with other developments of the past year (notably re Tennessee Eastman) points up a rapidly-developing appreciation of Canada's stature as a multi-million dollar consumer of dyestuffs. Previously, although Cyanamid operates one of the world's largest calcium cyanamid production units at Niagara Falls, Ont., the bulk of its output has been channeled to the U. S. A. and the company has not produced any dyestuffs or fine chemicals in the Dominion.

For many years Canadian dyestuff consumers have been supplied by imports from the U. S. A., England, and Switzerland, and no sizable Canadian production of dyestuffs has been realized. It is not improbable, however, that some manufacturing ventures may be inaugurated in the not distant future.

One company which has indicated that it has such plans under consideration is Naugatuck Chemicals Ltd., basic aniline producer.

British Drug Houses Builds Plant

The British Drug Houses (Canada) Limited has undertaken the construction of its first Canadian plant on the Queen Elizabeth Way a few miles west of Toronto. Estimated to cost $300,000 the steel and brick building will cover 40,000 square feet. The plant, expected to be ready next April, will employ a staff of about 100 to produce pharmaceutical products for the home market.

Until now the Canadian company acted chiefly as distributors of laboratory reagents and medicinal chemicals for the British parent organization.

Modern Canadian Lead Refining Facilities

Pictured above is one of the three tank rooms operated by Consolidated Mining & Smelting Co. of Canada Ltd., for the electrolytic refining of lead. Consolidated's Trail, B. C. smelter produces more than 700 tons daily.

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MARKET OUTLOOK

Continuance of General Chemical Shortage Predicted

Little Easing of Fats Stringency Foreseen

More Imported Botanicals Due in 1947

Tung Oil Shipments Scheduled to Rise

Widening Market For Vinyl Resins

Petroleum Consumption To Increase

Market Review

•

Many Major Chemical Shortages to Continue

The chemical industry has long been plagued by shortages, and although there are some indications that the situation in several commodities will ease within a few months, the outlook is far from roseate.

Among the chemicals in which supply and demand are most seriously out of balance is soda ash. At present, capacity production is falling some 500,000 tons a year behind demand, and there is little prospect that an alleviation of the stringency will be realized until new facilities some in, either in late 1947 or early 1948. Actually the limited availability of this alkali may govern glass, and alumina operations, and, of course, will have an effect on the multifarious other industries consuming a heavy tonnage of soda ash.

Chlorine is likewise extremely tight, with but little indication that any material easing of this condition will be effected for a good many months. Fertilizers are slated to fall short of demand at least until late next year.

An acute problem exists in industrial alcohol and chemical cotton pulp while glycerin is practically unobtainable. Cornstarch is expected to move into an easier position shortly. Casein inventories are at a 20 year low; paints, varnishes, lacquers, and plastics are tight.

According to the CPA it is hoped that the 1946 corn crop will permit greater production of industrial alcohol, and that by next March alcohol will be freely available. However, an extensive deficit in chemical cotton pulp—used in the production of high tenacity rayon tire cord, acetate rayons, and cellulose plastics—is forecast. A 50 percent drop in this year's Brazilian crop of cotton linters and an estimated domestic crop of only 9 million bales (vs. an annual average of 12 million bales) will contribute heavily to the shortage. Too, owing to the wood dearth, cellulose fiber production will remain short in 1947, even if domestic ceilings on wood pulpboard linters are increased to meet the high world price.

Little easing in the glycerine supply is foreseen, largely as a result of price troubles affecting soap fats—and the basic raw material shortage which obtains.

Summarizing the supply picture in drugs, streptomycin and penicillin production are rapidly catching up with demand. Quinine, quinidine, and other cinchona drugs continue critical however. In addition, unless the live stock slaughter rate picks up the shortage of animal glands and organs will worsen the already tight situation in derivative drugs.

Botanical Imports Boom

New import records for botanical drugs are expected to be established this year, with entries at present leading 1945 shipments by a two to one ratio. Too, all 300 of the natural drugs, spices, and gums used in packaged medicines and pharmaceuticals produced in this country are expected to be available by 1947.

Last year botanical drug imports stood at $33 million, up a million dollars over 1944 valuations, and advancing sharply from the $15 million of 1940 and 1943. Shipments received in the first quarter of this year totaled 6,226 tons, compared

Market Review

Heavy Chemicals—A primary feature of the market during the past month has been the growing feeling that a sudden tapering of domestic demand for chemicals may be realized as a result of labor troubles, raw material shortages, and other attendant production difficulties affecting major chemical consumers. The consensus is that such a possibility does exist, but it has not brought forth any more resale offers, nor has any weakening in chemical quotations come to pass.

Two industries which are specifically cited as reducing chemical demands are tanning and soapmaking. Tanneries have had to curtail operations as a result of the shortage of hides, and the dearth of fats has cut soap-producers' schedules. However, it is not expected that this will materially affect the supply-demand balance in either sodium bichromate or caustic soda.

No improvement in the extremely tight market situation in alkalines has developed, nor is any real easing in prospect for some months. Producers are immediately revising price schedules to conform with the 5 per cent increase granted by the OPA. Soda ash output is running for behind basic requirements and chlorine is in a similar position. No resale lots of any of the major alkalies have been offered in spite of lush bids.

Potash salts continue in heavy demand, and several shipments of sodium nitrate are scheduled to arrive in the near future. A good quantity of ammonium sulphate is reported on hand, but distribution troubles have crippled some consumers. Butyl alcohol prices rose recently, and ethyl alcohol formaldehyde, and methyl alcohol are extremely difficult to obtain. Calcium chloride deliveries, likewise, are lagging.

Fine Chemicals—Saccharin, antipyrine, aminopyrine, methyl, salicylate, and theobromine continue in a stringent position. Actually, imported theobromine has been offered at $9.00 a pound—double the usual domestic price. Caffein and synthetic camphor offerings are scarce. Menthol futures are beclouded, and dimmed by the upset conditions in China and the poor Brazilian mint crop. Some price resistance has been developing in the carnauba wax market but quotations are holding firm. The container shortage has resulted in some slowing of activity in waxes.

Glycerine remains as one of the commodities most difficult to obtain and producers are considering allocation distribution to hospitals, pharmaceutical houses, and other preferential categories. Streptomycin is moving steadily via the CPA and penicillin sales are at a high level. Fully two-thirds of the latter drug is being exported, but producers are not unaware of the recent construction of facilities in Holland, and the initiation of a Swedish unit, and the effect it may have on overseas markets.

Gum arabic and karaya are firm. No shipments of tragacanth have left the Persian Gulf for some months, and unless shipments reach the U. S. before the end of the year an acute shortage is in prospect. Vanillin, both natural and synthetic remain tight, as a result of the closing of one producing plant, and the lignin type is being avidly sought.

with 2,973 tons in the comparable period of 1945.

Despite the sharp increase in imports only eleven of the twenty key herbs are now arriving in prewar volume. Sumatra benzoin, European colchicum seed, and Chinese Ma Huang are still in short supply as a result of wartime dislocations.

Long Term Fatty Oil Dearth

Current indications are that world output of fats and oils may not reach the 1938-39 for a full year or more, because of the many factors which restrict production possibilities, in the opinion of the U. S. Department of Agriculture.

Political unrest, throughout the world, looms large as a depressing influence, and it may well be years before normal production of soybeans in Manchuria can be effected. Sumatran palm oil prospects are also adversely affected by comparable circumstances. Too, whale oil output has been curtailed to about one-half the 1938 level by an international agreement to conserve whale numbers.

Restoration to the prewar level of the quantity of fats and oils available for international trade likewise will require some years, because several producing areas, such as India, may consume a larger proportion of domestic output. However, too, the import demand of some countries may be restricted by lack of purchasing power.

Expansion of sunflower seed growing in Argentine is expected to continue, and the output of soybeans in the U. S. will remain above the 1938-39 level for some time.

Total exports of fats, oils, and oilseeds, from principal producing countries—in terms of oil or fat equivalent—are estimated for 1946 at 2,990,000 short tons, compared with 1938-39's average of 6,-511,000 short tons. The world's import requirements for fats and oils this year are about double the supply for export.

More Tung Oil Due Next Year

Not more than 10,000 tons of tung oil are expected to be available from China to the U. S. A. this year, and even attainment of this amount may not be possible because of demands from other countries. However, prospects for the year 1947 are considered to be much more favorable and both better crop and market conditions are anticipated.

Since liberation China has exported about 10,000 tons of tung oil (up to the end of July, 1946) of which the United Kingdom took 2000 tons, the European continent 500, the Soviet Union 1500, and the U. S. 6000 tons.

For the remainder of the present year these countries are expected to take at least 5000 tons out of a total export for the year of 25,000 tons. Demand for Chinese tung oil from Europe, as well as from Britain, seems to be more active even at the price above U. S. parity, partly in consequence of the more favorable rate for the pound sterling. Russia is requesting some tung oil on its barter agreement with China, and is also becoming interested in buying direct.

Too, domestic consumption in China is also increasing, owing to the favorable price in Chinese national currency compared with rice—formerly 1 to 4, now 1 to 1.

Vinyl Resins Scheduled For Expansion

Despite a ten fold increase since 1940 in production and use of vinyl resins there still are potential markets in coated fabrics, coated paper, film and sheeting capable of absorbing more than ten times the volume of such resins currently being produced, in the opinion of leading manufacturers. Such estimates are viewed as conservative appraisals of the role vinyls are destined to play in the replacement of present materials, plus the creation of new and superior consumer items.

At present, output of the vinyl resins is running at an annual rate of 120 million pounds (1940—12 millions). Market possibilities are placed at 400 million pounds in coating materials, film, and sheeting, whereas the use of resins in this manner amounts to only 35 million pounds currently.

Actually the national dollar volume consumption of plastics, all types, has grown from $20 million to $95 million in the years 1936 through 1940, and further stimulated by war needs should reach $750 million this year—37½ times what it was only ten years ago.

Larger Petroleum Demand for 1947

It was long anticipated that with the end of the war the consumption of petroleum would drop sharply. But such has not come to pass. The world today is producing and consuming the same quantities of petroleum that it did at the peak of the world war period. Increased civilian demands have offset the military losses.

However, the U. S. oil industry does face a sharp decline in demand during 1946, and anticipated requirements of 4,800,000 barrels per day will be about ten per cent less than in 1945. According to the predictions of producers the sharpest decline will be in Texas and California.

Nevertheless, this year is regarded as the difficult phase of the postwar transition for the petroleum industry and that barring unusual circumstances the upward trend will be resumed in 1947 and will continue at a steady, moderate rate, for at least several years thereafter.

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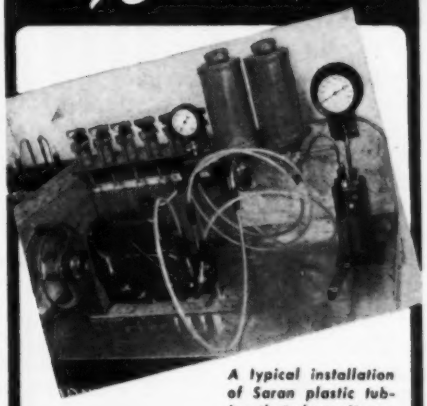

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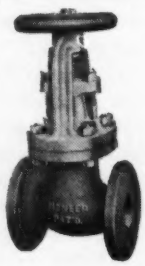

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Aluminum Output Down in 1945

Primary aluminum output in the United States in 1945 is estimated at 496,487 short tons, a decline of 36 per cent from the 776,446 tons produced in 1944 and 46 per cent below the all-time high of 920,179 tons in 1943, according to the Bureau of Mines, United States Department of the Interior.

There was a moderate production increase early in the year as a result of temporary military reverses on the western front in Europe, but output dropped steadily after May as the war drew to a close. All Government-owned aluminum metal and alumina plants were closed Oct. 31, 1945, leaving only the privately-owned plants of the Aluminum Company of America and Reynolds Metals Co. in operation.

	Production	
Year	Short tons	Value
1941	309,067	$100,395,000
1942	521,106	151,371,000
1943	920,179	265,380,000
1944	776,446	222,416,000
1945	496,487	141,924,000

Recovery of secondary aluminum in 1945 totaled 298,387 short tons compared with 325,645 tons in 1944. It included 2,241 tons of aluminum as pure metal (98.5+ per cent), 298,871 tons in aluminum alloys, 1,162 tons in brass and bronze, 267 tons in zinc-base alloys, and 846 tons of aluminum in chemical compounds. Production in the form of secondary ingots totaled 198,426 tons (214,879 tons in 1944). The secondary aluminum recovered in 1945 required the consumption of 323,676 tons of aluminum scrap, of which 10 per cent was old and 90 per cent was new scrap.

Bauxite Output Gains

Domestic production of crude bauxite in the second quarter of 1946 exceeded 300,000 long tons, a gain of 29 per cent over the preceding quarter and a quantity greater than in any quarter prior to the middle of 1941. The output, partly estimated, was 303,163 long tons (257,689 tons dried equavalent) in the second quarter compared with 234,187 tons (199,059 tons dried equivalent) in the first quarter. Arkansas mined 94 per cent of the second-quarter production, and Alabama, Georgia and Virginia together produced the remaining 6 per cent.

Imports of bauxite in the second quarter were 196,789 long tons, 25 per cent greater than in the first quarter of 1946 but 13 per cent less than in the third quarter of 1945. Of second-quarter imports totaling 196,798 tons, 189,798 were from Surinam and 7,000 from British Guiana. Imports comprised 44 per cent of the new supply in the first half of 1946 compared with 43 per cent in 1945, 20 per cent in 1942-44, and 54 per cent in 1925-41.

Rayon Deliveries Register Improvement

Total rayon shipments in August at 69,400,000 pounds were 3% above July and eight months' deliveries this year totaled 555,300,000 pounds or 10% above those in the corresponding 1945 period, Rayon Organon reports.

Total August rayon filament yarn shipments amounted to 53,400,000 pounds or 3% above the previous month. This increase was entirely due to the larger deliveries of viscose+cupra yarn. On the other hand, acetate yarn deliveries remained at essentially the July level mainly because of the continuation of a strike at one acetate yarn plant. Rayon staple fiber shipments in August at 16,000,000 pounds were 2½% above July; this figure is composed of 12,200,000 pounds of viscose and 3,800,000 pounds of acetate staple fiber.

Eight months' 1946 filament yarn deliveries totaled 434,900,000 pounds (313,300,000 pounds viscose+cupra and 121,600,000 pounds acetate), while staple fiber shipments aggregated 120,400,000 pounds (90,900,000 pounds of viscose and 29,500,000 pounds of acetate). A comparison of these data with the same 1945 period show the following changes: viscose+cupra filament yarn +10%, acetate filament yarn +8½%, viscose staple +9%, and acetate staple +16%.

Superphosphate Production Shaded

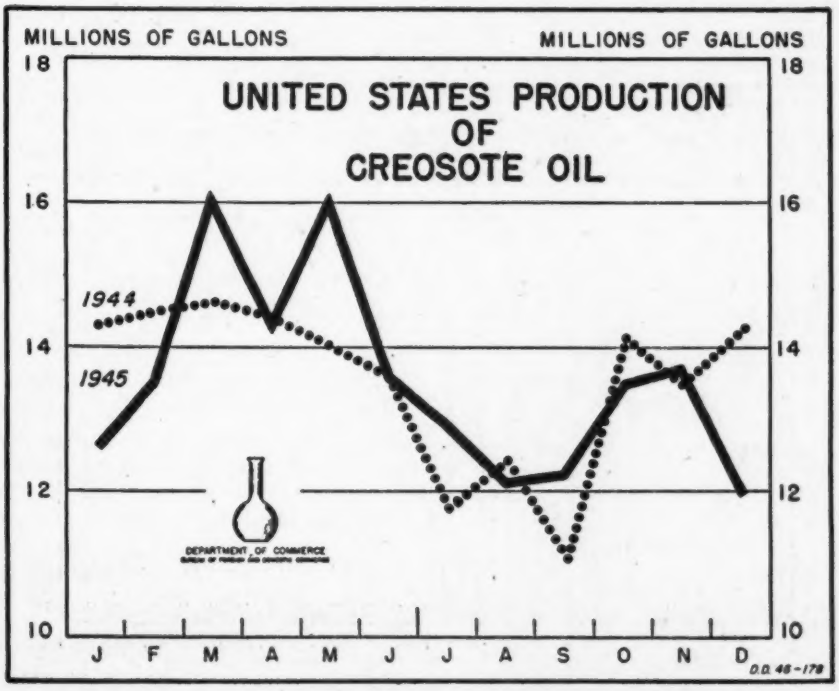
Superphosphate production at the 120 plants of acidulators reporting to the National Fertilizer Association increased 30,000 tons, basis 18 per cent APA, from June to July. Production was 37 per cent greater in July 1946 when compared with July 1943, 18 per cent greater than July 1944, but 3 per cent less than July 1945. Production in the first seven months of this year was running a little ahead of the same period a year ago.

Total superphosphate disposed of during July was 13 per cent under a year ago, just about the same as July 1944, but 22 per cent higher than July 1943. In the first seven months of this year it amounted to 3,574,000 tons and was 8 per cent higher than for the corresponding period a year ago.

During July stocks rose 18 per cent and were 163,000 tons greater than they were at the end of May when they hit the extremely low point of 302,000 tons. However, stocks are still 19 per cent under those at the end of July a year ago.

Further Decline in Lead Output

The average daily rate of lead output from domestic mines in July continued to decline for the fifth consecutive month, according to the Bureau of Mines, United States Department of the Interior. Al-



though the total net production increased owing to the longer month, the average daily output dropped from 814 tons to 808 tons. Settlement of labor disputes at plants of the American Smelting & Refining Company in several States and at the United States Smelting, Refining & Mining Company operations in Utah stimulated production in the Western States, but the increased output failed to offset a corresponding decline in lead production in the Central and Eastern States.

The termination of the Office of Price Administration and the Premium Price Plan on June 30 forced many lead mines to restrict or discontinue production. Uncertainty as to the future of the Premium Price Plan continued until July 25 when a bill (effective July 26) extending the Office of Price Administration on a restricted basis was approved by the President. The re-establishment of premium payments for over-quota lead production came too late, however, to affect reversal in the downward trend in July.

Production of Aluminum Salts Shaded

Aluminum salts shipped in the United States in 1945 decreased 2 percent in quantity and 8 percent in value compared with 1944, according to the Bureau of Mines, United States Department of the Interior.

Producers of aluminum salts reported the shipment of 650,071 short tons valued at $19,169491 in 1945 compared with 660,288 tons valued at $20,742,026 in 1944. Shipments of aluminum sulfate, the principal product of the aluminum salts industry, totaled 581,441 tons in 1945 compared with 590,665 tons in 144, a decrease of 2 percent. A slight decrease was noted also in the production of sodium aluminum sulfate, whereas the production and sales of sodium aluminate, ammonia and potash alum increased.

Manufacturers of aluminum salts and alumina for the chemical and other industries reported the consumption of approximately 211,273 long tons of domestic bauxite (on an as shipped basis) valued at $2,135,740 and 46,932 tons of imported bauxite valued at $815,776. In addition the consumption of the following raw materials was reported by aluminum salts producers: 13,249 short tons of aluminum trihydrate, 13,523 tons of secondary aluminum, 91,073 tons of clay, and a quantity of alunite and bichromate residue.

Zinc Production Slump

The domestic mine production of zinc in July slumped sharply to 32,414 short tons, a 22-per cent decline from the June output, and smaller than the average monthly production of any year since 1934. Important factors contributing to the July decrease were uncertainty regarding the future of the Premium Price

COAL-BASED CHEMICALS

		July, 1946[b] *Quantity*	*Calendar year to date* *1946*	*1945*
Sales:				
Ammonium sulfate	pounds	86,068,012	632,602,926	1,014,589,000
Ammonia liquor (NH_3 content)	do	3,614,301	25,301,503	31,155,800
Naphthalene (crude):				
Solidifying at less than 70°C	do	840,755	6,314,514	•
At 70° and less than 79°C[d]	do	6,185,130	27,648,758	•
Total	do	7,025,885	33,963,272	52,986,500
Benzol:				
Motor	gallons	2,994,144	18,082,469	10,299,600
Nitration (1°)	do	4,525,590	25,355,587	35,382,900
Industrial pure (2°)	do	4,175,462	27,787,038	48,275,000
All other grades	do	127,667	1,197,882	628,400
Toluol:				
Nitration (1°)	do	899,852	5,662,778	16,335,300
Industrial pure (2°)	do	177,230	1,398,152	1,087,000
All other grades	do	29,795	642,025	601,100
Xylol:				
All grades	do	448,623	3,018,991	4,638,800
Solvent naphtha:				
Refined light solvent	do	•	•	[f]
Crude heavy solvent	do	321,923	1,596,096	[f]
Pyridine:				
Refined	do	9,626	63,438	64,600
Crude, dry basis	do	21,044	157,027	281,600
Coal tar:				
Crude	do	33,160,096	192,128,650	246,121,700
Creosote oil	do	2,761,571	13,630,948	21,437,800
Value of sales:				
Ammonium sulfate		$1,235,281	$8,349,299	$12,979,900
Ammonia liquor (NH_3 content)		107,862	760,831	942,000
Naphthalene (crude):				
Solidifying at less than 70°C		14,478	112,999	•
At 70° and less than 79°C[d]		140,288	626,522	•
Total		154,776	739,531	1,096,000
Benzol:				
Motor		263,798	1,561,652	913,300
Nitration (1°)		591,829	3,249,387	4,613,000
Industrial pure (2°)		524,412	3,541,403	6,288,600
All other grades		19,032	175,632	92,300
Toluol:				
Nitration (1°)		173,303	1,315,367	4,505,500
Industrial pure (2°)		37,917	343,886	291,100
All other grades		3,938	89,122	84,100
Xylol:				
All grades		106,106	750,039	1,208,100
Solvent naphtha:				
Refined light solvent		•	•	[f]
Crude heavy solvent		37,233	185,085	[f]
Pyridine:				
Refined		31,504	208,002	223,500
Crude, dry basis		17,160	108,878	205,500
Coal tar:				
Crude		1,811,498	10,462,957	12,975,900
Creosote oil		362,340	1,761,710	2,648,500

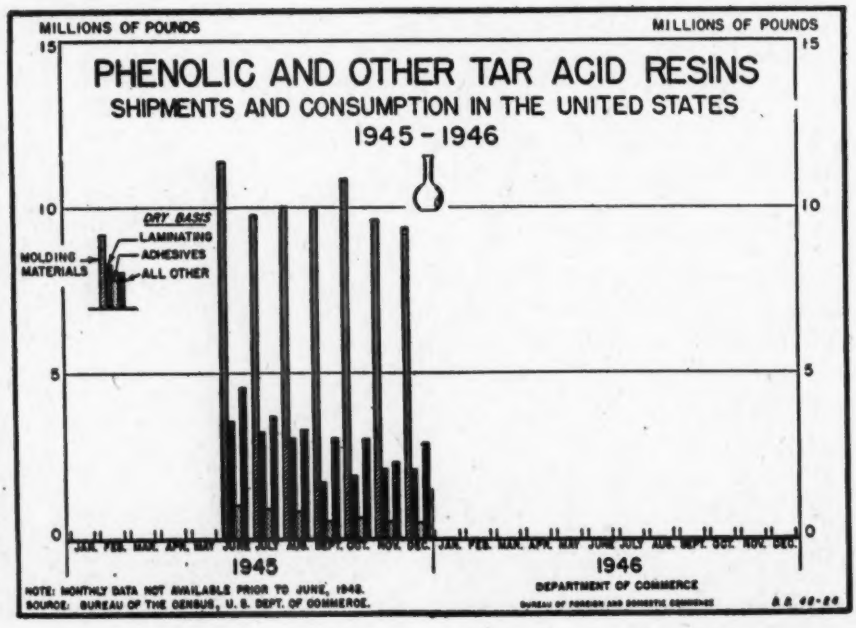
[a] Data reported to Bureau of Mines by byproduct-coke plant operators only. Excludes sales at gas plants (other than byproduct-coke plants), tar refineries, and synthetic chemical plants. [b] Subject to revision. [c] Not comparable with 1946 because of change in melting point ranges. [d] Includes two grades (solidifying at 70°C to less than 77° and 77° to less than 79°) in order to prevent disclosure of individual operations. • Data withheld to prevent disclosure of individual operations. [f] Not available.

PAINT, VARNISH, LACQUER, AND FILLER

Item	*July 1946*	*June 1946*	*July 1945*
Total sales reported by 680 establishments	$65,187,312	$66,071,218	$52,623,448
Classified sales reported by 580 establishments:			
Trade sales of paint, varnish and lacquer	$34,986,539	$35,769,366	$22,689,192
Industrial sales, total	$24,256,325	$23,653,045	$24,485,398
Paint and varnish	17,983,418	17,649,010	18,578,202
Lacquer	6,272,907	6,004,035	5,907,196
Unclassified sales reported by 100 establishments	$5,944,448	*$6,648,807	$5,448,858

(Source: Bureau of the Census)

* Revised.



Plan which forced many zinc mines to restrict or discontinue production and continuation of the labor strike at mines of the New Jersey Zinc Co. in New Jersey causing zinc production in the Eastern States to drop 4 per cent below the June output. Although premium payments for over-quota production of zinc and lead were revived, effective July 26, when the President signed a bill extending the Office of Price Administration on a restricted basis, the legislation came too late to affect a reversal in the downward trend in July.

Slag Production Registers Slight Gain

In 1945, output of commercialized blast-furnace slag totaled 12,635,868 tons, 2 per cent more than the 12,405,992 tons reported in 1944. Sales of air-cooled slag increased 3 per cent. These statistics are based on a canvass, conducted by the National Slag Association, of the 32 companies that prepared blast-furnace slag for commercial use. The results were assembled in cooperation with the Bureau of Mines.

Practically all of the commercial production is east of the Mississippi River, chiefly at steel centers located in Ohio, Alabama, Pennsylvania, and Illinois. Shipments, however, are made into all States east of the Mississippi except some of the New England States outside the economic range of sources of supply.

The average shipping range of blast-furnace slag in 1945 was 63 miles by rail, 15 by truck, and 125 by waterway. In most instances shipments did not exceed 100 miles by railroad, 30 by truck, and 250 by waterway.

An outstanding development is the increase in production of lightweight slag for use in building construction. To service the seemingly insatiable demand for building materials in the latter part of 1945, installation of concrete block plants reached a record rate. As they began to operate, demand for lightweight aggregates grew in proportion. Tests and experience both in this country and in Europe indicated that expanded slag is particularly valuable in the United States, but other methods are under investigation also.

Fertilizer Tag Sales Up Eleven Percent

Fertilizer tax tag sales totaled 368,000 equivalent tons in July and were 51 per cent greater than those reported a year ago, according to the compilation of The National Fertilizer Association. Nine of the 11 Southern States were higher than a year ago and the decrease in the other two States, Virginia and Georgia, was relatively small. Each of the Midwestern States showed substantial increases. Kansas sales jumped almost 5 times over July 1945 and Missouri sales were more than 3 times greater. The increase in July was even more pronounced when compared with July two years ago; sales were 2½ times greater in the South and almost twice as large in the Midwest.

In the first 7 months of the calendar year, January-July, tag sales totaled 6,308,000 equivalent tons in the 16 reporting States and were 641,000 tons, or 11 per cent above the sales in the corresponding period a year ago and 22 per cent above 2 years ago. Sales in the South were 9 per cent larger than a year ago with increases reported in each of the 11 States. Increases ranging from 1 per cent to 10 per cent were shown in Virginia, North Carolina, South Carolina, Georgia, Tennessee and Louisiana; increases ranging from 10 per cent to 20 per cent were reported in Florida, Ala-

PLASTICS AND SYNTHETIC RESINS

These statistics represent the shipments and consumption of plastics and synthetic resins as reported by 77 manufacturing companies and company departments. Data for synthetic resins for protective coatings are not included. Shipments, for the purpose of this report, include data for plastics and resins which are manufactured by the reporting companies or company divisions and shipped to outside users. Consumption refers to the quantities of plastics and resins which are manufactured and used by the reporting companies or company divisions. Statistics are available beginning June 1945. Data for cellulose plastic products only are available for earlier periods.

Shipments and Consumption in the United States

Item	*Shipments and Consumption (In pounds) July 1946*	*June 1946*
Cellulose acetate and mixed ester plastics:[1]		
Sheets:		
Continuous (under .003 gauge)	770,495	690,011
Continuous (.003 gauge and upward)	687,416	751,572
All other sheets, rods and tubes	425,370	384,765
Molding and extrusion materials	7,166,800	*6,735,990
Nitrocellulose plastics:[1]		
Sheets	921,163	864,420
Rods and tubes	602,614	564,629
Phenolic and other tar acid resins:		
Laminating (dry basis)	2,338,486	2,573,412
Adhesives (dry basis)	1,199,637	996,569
Molding materials[1]	14,190,536	14,161,634
All other (dry basis)[2]	4,977,055	4,818,844
Urea and melamine resins:		
Adhesives (dry basis)	3,371,475	2,596,207
Textile and paper treating (dry basis)	1,303,859	886,620
All other (dry basis)[2]	263,649	145,115
Polystyrene[1]	5,746,830	5,639,484
Vinyl resins:		
Sheeting and film[1]	2,107,886	1,857,160
Textile and paper coating resins (resin content)	1,624,203	1,234,522
Molding and extrusion materials (resin content)	5,398,194	4,978,168
Adhesives (resin content)[2]	*2,965,946	**2,402,566
All other (resin content)[2]		
Miscellaneous plastics and resins:		
Molding and extrusion materials[1] [5]	6,403,457	4,850,236
All other (dry basis)[2] [6]	3,695,753	2,191,560

* Revised.

[1] Includes fillers, plasticizers and extenders. [2] Excludes data for protective coating resins. [3] Cannot be shown separately without disclosing operations of individual establishments. [4] Proportion of estimate, 2.9 percent or less. [5] Includes data for ethyl cellulose, urea and melamine acrylic acid and miscellaneous molding and extrusion materials. [6] Includes data for petroleum resins, acrylic acid, ester resins, mixtures and miscellaneous synthetic materials.

(*Source: Bureau of the Census*)

PLASTIC WATER PAINTS, COLD-WATER PAINTS AND CALCIMINES

The quantity of lime and cement bound interior cold-water paints sold by manufacturers in July set a new record for the fifth consecutive month. Sales showed an 11 percent increase over the high of the previous month and were more than double those of a year ago. Although July sales of plastic texture water paints were slightly less than those of June, they maintained a level only 3 percent below April's high.

More glue bound interior cold-water paints were sold in July than in any one month since October 1941. July sales showed an increase of 65 percent over June and were almost double those of a year ago.

The amount of hot-water calcimines sold in July was 42 percent below that of June, but was 8 percent above the same month last year. Cold-water calcimines, however, showed a small increase in sales this month compared with June, but were 18 percent below those of a year ago.

Products	*July 1946*	*June 1946*	*July 1945*
PLASTIC-TEXTURE WATER PAINTS, TOTAL:[1]			
Pounds	1,678,772	1,682,514	784,331
Value	$115,070	$111,108	$50,059
COLD WATER PAINTS, TOTAL VALUE	$769,428	$719,649	$481,904
Interior, total value	$345,664	$326,850	$306,484
Casein and other protein bound:			
Paste and semipaste form—			
Gallons	212,341	193,277	179,438
Value	$269,390	$243,749	$235,606
Dry powder form—			
Pounds	728,785	819,024	775,023
Value	$60,043	$72,703	$61,553
Glue-bound—			
Pounds	368,799	223,605	198,370
Value	$16,231	$10,398	$9,325
Exterior, total value	$423,764	$392,799	$175,420
Casein and other protein bound:			
Pounds	336,870	372,761	275,467
Value	$18,997	$22,019	$16,839
Lime and/or cement bound—			
Pounds	5,237,218	4,727,048	2,029,289
Value	$404,767	$370,780	$158,581
CALCIMINES, TOTAL:			
Pounds	1,658,723	2,175,725	1,808,705
Value	$73,170	$95,687	$87,066
Hot-water—			
Pounds	745,761	1,278,758	691,837
Value	$33,479	$57,245	$32,544
Cold-water—			
Pounds	912,962	896,967	1,116,868
Value	$39,691	$38,442	$54,522

[1] Includes Paste and Dry Powder Plastic-Texture Water Paints which cannot be shown separately without disclosing operations of individual companies.

bama and Arkansas; while Texas sales were 45 per cent higher and Oklahoma 100 per cent higher than a year ago.

January-July tag sales in the Midwest were 27 per cent greater than for the same period a year ago with Missouri showing the largest percentage gain. Substantial increases were also reported in Kansas, Indiana and Illinois, with a smaller percentage increase being reported for Kentucky.

CONSUMPTION OF TURPENTINE

	1946 (April-June) Total (Bbls.-50 gals.)
Abbatoirs	0
Adhesives & plastics	61
Asphaltic products	0
Automobiles & wagons	35
Chemicals & pharmaceuticals	21,602
Ester gum & synthetic resins	4,100
Foundries & foundry supplies	201
Furniture	41
Insecticides & disinfectants	3
Linoleum & floor covering	0
Matches	0
Oils & greases	4
Paint, varnish & lacquer	5,052
Paper & paper size	0
Printing ink	59
Railroads & shipyards	1,901
Rubber	90
Shoe polish & shoe materials	2,190
Soap	0
Other industries	34
Total industrial reported	35,373
Not accounted for[1]	116,764
Apparent U. S. consumption	152,137

[1] Principally unreported distribution of turpentine through retailers who sell in small quantities to ultimate consumers.

CONSUMPTION OF ROSIN

	1946 (April-June) Total (Drums-520 lbs.)
Abbatoirs	126
Adhesives & plastics	4,572
Asphaltic products	384
Automobiles & wagons	43
Chemicals & pharmaceuticals	76,464[2]
Ester gum & synthetic resins	67,682
Foundries & foundry supplies	3,215
Furniture	1
Insecticides & disinfectants	1,435
Linoleum & floor covering	3,395
Matches	657
Oils & greases	3,458
Paint, varnish & lacquer	28,121
Paper & paper size	79,209
Printing ink	2,146
Railroads & shipyards	3,723
Rubber	5,096
Shoe polish & shoe materials	1,610
Soap	38,674
Other industries	1,107
Total industrial reported	321,118[1]
Not accounted for[2]	28,652
Apparent U. S. consumption	349,770

[1] Includes, as rosin consumed, the "B wood resin" produced in refining FF wood rosin to paler grades. No data reported on the consumption of "B wood resin" as such.

[2] The discrepancy between the total industrial consumption reported and the apparent U. S. consumption is due partly to unreported industrial consumption and partly to failure of some consumers to distinguish in their reports between gum rosin, wood rosin, and modified or derived rosins.

Chemicals Wartime End-Use Distribution

CARBON TETRACHLORIDE: July 1, 1944-June 30, 1945
(Thousands of pounds pure)

	Amount	*Per cent*
Total Allocations	*223,092*	*100.0*
Direct military[1]	56 885	25.5
Foreign	2,422	1.1
Other uses	*163,785*	*73.4*
Fire extinguishers	94,291	42.3
Degreasing compounds	31,511	14.1
Dry cleaning	10,892	4.9
Agriculture	4,837	2.1
Drugs	3,549	1.6
Synthetic rubber	3,366	1.5
Miscellaneous uses and small orders	15,339	6.9

GELATIN
Production, Shipments, and Stocks
(Pounds)

Item	*1946* *June*	*May*
Production		
Gelatin, total	3,172,767	3,825,282
Edible	2,037,982	2,271,425
Technical	183,280	212,975
Pharmaceutical	315,552	368,329
Photographic	635,953	972,553
Shipments		
Gelatin, total	3,323,965	3,637,576
Edible	2,112,229	2,299,527
Technical	187,619	198,146
Pharmaceutical	394,813	340,672
Photographic	629,304	799,231
Stocks (End of Month)		
Gelatin, total	6,201,259	6,320,894
Edible	2,652,469	2,695,153
Technical	131,704	136,043
Pharmaceutical	347,450	426,711
Photographic	3,069,636	3,062,987

DIMETHYL PHTHALATE: 1944
(Thousands of pounds)

	Amount	*Per cent*
Total Allocations	*30,045*	*100.0*
Direct military[1]	64	0.2
Foreign	2,313	7.7
Other uses	*27,668*	*92.1*
Insect repellant	26,927	89.6
Plastics	595	2.0
Cable lacquer and penetrants	58	0.2
Miscellaneous uses and small orders[2]	88	0.3

[1] End-use data not available.

[2] Includes small amounts allocated for lacquers, film, lubricants, adhesives, denaturants, and resale.

ETHYLENE GLYCOL: 1944
(Thousands of pounds)

	Amount	*Per cent*
Total Allocations	*189,169*	*100.0*
Export[1]	32 850	17.4
Other uses	*156,319*	*82.6*
Antifreeze[2]	119,874	63.4
Explosives	14,843	7.8
Cellophane	6,650	3.5
Coolants	6,192	3.3
Chemicals and synthetic resins	3,826	2.0
Hydraulic brake fluid[3]	3,202	1.7
Radio condenser fluid	538	0.3
Textiles and rayon	140	0.1
Miscellaneous uses and small orders[4]	1,054	0.5

[1] Excludes Canada; see not 2.

[2] Includes military requirements plus a small amount for undesignated purposes and all civilian and Canadian antifreeze assignments.

[3] Includes de-icing preparations.

[4] Includes ethylene glycol used for drugs and cosmetics; for wood stains, molding-sand binders, cutting oils, and gas and air dehydration.

NAPHTHALENE (ALL GRADES): 1944
(*Thousands of pounds*)

Use	*Amount*	*Per cent*
Total Allocations	259,851	100.0
Phthalic anhydride	170,262	65.5
Other intermediates[1]	53,030	20.4
Moth repellants and insecticides[2]	22,339	8.6
All other uses[3]	14,220	5.5

[1] Includes naphthalene used to manufacture beta-naphthol, chlorinated naphthalene and other intermediates.

[2] Includes naphthalene used to manufacture agricultural insecticides.

[3] Includes oil additives and oil treating agents, chemical manufactures, wetting and tanning agents, and other primary products.

DIBUTYL PHTHALATE: January 1, 1944-June 30, 1945
(Thousands of pounds)

	Amount	*Per cent*
Total Allocations	*78,108*	*100.0*
Direct military[1]	58,247	74.6
Foreign	2,879	3.7
Other uses	*16,982*	*21.7*
Synthetic rubber	4,698	6.0
Insect repellents	3,712	4.8
Plastics	2,877	3.7
Lacquers	1,956	2.5
Cellophane	1,507	1.9
Adhesives	933	1.2
Photography	579	0.7
Textile coatings	245	0.3
Cable	225	0.3
Miscellaneous uses and small orders	250	0.3

[1] End-use data not available.

ISOPROPYL ALCOHOL: January 1, 1944-June 30, 1945
(Thousands of gallons of mixed grades)

	Amount	*Per cent*
Total Allocations	*123,706*	*100.0*
Foreign	159	0.1
Other uses	*123,547*	*99.9*
Chemical uses	*92,258*	*74.6*
Acetone	86,291	69.8
Isopropyl acetate	4,028	3.3
Xanthates	139	0.1
Other chemical uses[1]	1,800	1.4
Technical uses	*31 289*	*25.3*
De-icing and antifreeze	11,152	9.0
Technical coatings	4,832	3.9
Rubbing alcohol	2,941	2.4
Solvents, cleaners, blends	2 156	1.7
Plastics and resins	1,956	1.6
Drugs and cosmetics	1,737	1.4
Textile processing	986	0.8
Pectin and zein	898	0.7
Gasoline antioxidants	604	0.5
Disinfectants and germicides	477	0.4
Brake fluids	475	0.4
Miscellaneous uses and small orders[2]	3,075	2.5

[1] Includes chemicals for laboratory use.

[2] Includes embalming fluids.

PHOSPHORUS: 1944
(Thousands of pounds)

	Amount	*Per cent*
Total Allocations	*177,787*	*100.0*
Direct military[1]	64,190	36.0
Foreign	5,507	3.0
Other uses	*108,090*	*61.0*
Foods and fertilizers	38,166	21.5
Plastics, coatings, and surface protection	26,255	14.8
Soaps and detergents	19,669	11.1
Petroleum refining	6,681	3.8
Matches and fire retardants	5,304	3.0
Pharmaceuticals and dentifrices	4,047	2.3
Miscellaneous uses and small orders	7,968	4.5

[1] End-use data not available.

Tariff Commission Organic Chemical Output

Highlights of the recently released U. S. Tariff Commission preliminary report on 1945 production and sales of synthetic organic chemicals include the following:

The quantity of oil-gas tar, water-gas tar, and coal tar produced in 1945 is estimated at 899 million gallons, seven per cent less than the 1944 output of 968 million gallons.

The output of benzene, toulene, and creosote oil decreased in 1945 as compared with 1944. Naphthalene production continued at approximately the 1944 level of about 290 million pounds.

In 1945, production of crude products from petroleum and natural gas for chemical conversion amounted to 3 billion pounds and sales amounted to 2.8 billion pounds, valued at 214 million dollars.

The report shows that the total 1945 output of intermediates and finished products, 14.7 billion pounds was slightly less than the 1944 peak of 14.9 billion pounds. Sales amounted to 9.3 billion pounds valued at 1.8 billion dollars; the remaining quantity produced was used in the producing plants for further manufacture.

Decreases in production are shown by dyes and miscellaneous acyclic chemicals. Dyes dropped 5 per cent and miscellaneous acyclic chemicals 6 per cent below the 1944 level. The miscellaneous acyclic chemicals include halogenated hydrocarbons, alcohols and various acids.

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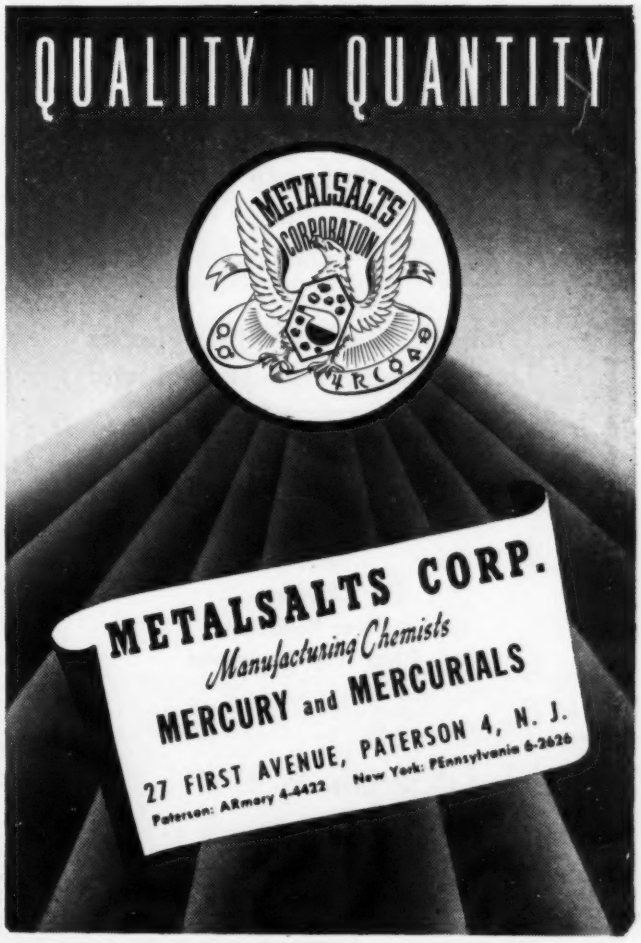

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Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00

September, 1944, $0.883 *September, 1945, $0.871*

September, 1946, $0.743

	Current		1946		1945	
	Low	High	Low	High	Low	High
Acetaldehyde,99%,drs.wks. lb.	.11	.14	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.13	.11½	.13	.11½	.13
Acetone, tks, delv. .....lb.	.06	.07	.06	.07	.06	.07
ACIDS						
Acetic, 28%, bbls ....100 lbs.	3.38	3.63	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.40	9.15	9.40	9.15	9.40
tks, wks. .....100 lbs.	6.93	7.25	6.93	7.25	6.93	7.25
Acetylsalicylic, Standard USP .....lb.	.46	.54	.40	.54	.40	.54
Benzoic, tech. bbls. .....lb.	.43	.47	.43	.47	.43	.47
USP, bbls, 4,000 lbs. up lb.	...	.54	...	.54	...	.54
Boric tech, bbls. c-l. ..tons *a*	...	109.00	...	109.00	...	109.00
Chlorosulfonic, drs, wks. ..lb.	.03	.04½	.03	.04½	.03	.04½
Citric, USP, crys, gran, bbls. .....lb. *b*	.20	.21	.20	.21	.20	.21
Cresylic 50%, 210-215° HB, drs. wks. frt. equal gal.	.81	.96	.81	.96	.81	.83
Formic, 85%-90% cbys...lb.	.10	.11½	.10	.11½	.10	.11½
Hydrofluoric, 30% rubber, dms. .....lbs.	.08	.09	.08	.09	.08	.09
Lactic, 22%, lgt, bbls wks lb.	.039	.0415	.039	.0415	.039	.0415
44%, light, bbls wks ...lb.	.073	.0755	.073	.0755	.073	.0755
Maleic, Anhydride, drs ...lb.	.25	.26	.25	.26	.25	.26
Muriatic 18° cbys ....100 lb.	1.50	2.45	1.50	2.45	1.50	2.45
20° cbys, c-l, wks. ..100 lb.	...	1.75	...	1.75	...	1.75
22° cbys, c-l, wks. ..100 lb.	...	2.25	...	2.25	...	2.25
Nitric,36°,cbys, wks 100 lbs. *c*	5.00	5.25	5.00	5.25	5.00	5.25
38°, c-l, cbys, wks 100 lbs. *c*	...	5.50	...	5.50	...	5.50
40°, c-l, cbys, wks 100 lbs. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks 100 lbs. *c*	...	6.50	...	6.50	...	6.50
Oxalic, bbls, wks .....lb.	.11¼	.12½	.11¼	.12½	.11¼	.12½
Phosphoric, 100 lb. cbys, USP .....lb.	.10½	.13	.10½	.13	.10½	.13
Salicylic tech, bbls .....lb.	.26	.42	.26	.42	.26	.42
Sulfuric, 60°, tks, wks ..ton	...	13.00	...	13.00	...	13.00
66°, tks, wks .....ton	...	16.50	...	16.50	...	16.50
Fuming 20% tks, wks..ton	...	19.50	...	19.50	...	19.50
Tartaric, USP, bbls .....lb.	.62½	.63	.62½	.71	.70½	.71
Alcohol, Amyl (from Pentane) tks, delv .....lb.	...	.131	...	.131	...	.131
Butyl, normal, syn, tks lb.	...	.10¾	...	.10¾	...	.10¾
Denatured, CD 14, c-l drs .....gal. *d*	...	.613	...	.613	...	.59
Denatured, SD, No. 1, tks.*d*	...	.542	...	.542	...	.52
Ethyl, 190 proof tks..gal.	...	17.65½	...	17.65½	...	17.60
Isobutyl, ref'd, drs ... lb.	...	.0660	...	.0660	...	.086
Isopropyl ref'd, 91%, dms .....gal.	.41	.44	.38	.44	.37½	.66½
Alum, ammonia, lump, bbls, wks .....100 lb.	...	4.25	...	4.25	...	4.25
Aluminum, 98-99% ...100 lb.	15.00	16.00	15.00	16.00	15.00	16.00
Chloride anhyd l.c.l. wks lb.	.09	.12	.09	.12	.08	.12
Hydrate, light, bgs. ....lb.	...	.14½	...	.14½	.14½	.15
Sulfate, com'l. bgs, wks, c-l .....100 lb.	1.15	1.20	1.15	1.25	1.15	1.25
Sulfate, iron-free, bgs, wks .....100 lb.	1.75	2.00	1.75	2.00	1.75	2.10
Ammonia anhyd, cyl .....lb.	...	.14½	...	.14½	...	.14½
Ammonia, anhyd. fert. tank cars, wks. frt. equalized ton	...	59.00	...	59.00	...	59.00
Ammonium Carbonate, USP, lumps, dms ....lb.	.08¼	.09½	.08¼	.09½	.08¼	.09¼
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45	5.15
Nitrate, tech. bags, wks. lb.	.0435	.0450	.0435	.0850	.0435	.0850
Oxalate pure, grn. bbls. lb.	...	.23	...	.23	.27	.33
Perchlorate, kgs .....lb.	no stocks		no stocks		no stocks	
Phosphate, dibasic tech. bgs .....lb.	.07	.07¾	.07	.07¾	.07	.08½
Stearate, anhyd. dms....lb.	...	.34	...	.34	...	.34
Sulfate, dms, bulk ....ton	28.20	30.00	28.20	30.00	28.20	29.20
Amyl Acetate (from pentane) tks., delv. .....lb.	...	.15½	...	.15½	...	.15½
Aniline, Oil, drs .....lb.	.12	.13	.11½	.13	.11½	.12½
Anthraquinone, sub, bbls...lb.	...	.70	...	.70	...	.70
Antimony Oxide, bgs ....lb.	.17	.17½	.15	.17½	.15	.16
Arsenic, whi, kgs—powd. lb.	.05	.05¾	.04	.05¾	.04	.04¼

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs less in each case; *d* Prices given are Eastern schedule, *a* Powdered boric acid $5 a ton higher; *b* Powdered citric acid is ½c higher.

		Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Barium Carbonate precip, wks, bgs.	ton	60.00	75.00	60.00	75.00	60.00	75.00
Chloride, tech, cyst, bgs, zone 1	ton	73.00	78.00	73.00	78.00	73.00	78.00
Barytes, floated, bbls.	ton	...	36.00	...	36.00	...	36.00
Bauxite, bulk mines	ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms	lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, tks, ft all'd	gal.	...	.15	...	.15	...	.15
Benzyl Chloride, cbys	lb.	.20	.21	.20	.24	.22	.24
Beta-Naphthol, tech, bbls, wks	lb.	.21	.23	.21	.24	.23	.24
Bismuth metal, ton lots	lb.	...	1.60	1.25	1.60	...	1.25
Blanc Fixe, 66⅔% Pulp, bbls, wks	ton	40.00	40.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks,100 lb.		2.50	3.10	2.50	3.60	2.50	3.60
Borax, tech, c-l, bgs	ton	...	45.00	...	45.00	...	45.00
Bordeaux Mixture, drs	lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases	lb.	.21	.23	.21	.23	.21	.30
Butyl, acetate, norm. drs	lb.	.2295	.2347	.1860	.2364	17.90	19.45
Cadmium Metal	lb.	1.30	1.50	.90	1.50	.90	.95
Calcium, Acetate, bgs, 100 lb.		3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs	ton	50.00	90.00	50.00	90.00	50.00	95.00
Carbonate, c-l bgs	ton	18.00	22.00	18.00	22.00	18.00	22.00
Chloride, flake, bgs c-l	ton	18.50	35.00	18.50	35.00	18.50	35.00
Solid, 73-75% drs, c-l,	ton	18.00	34.50	18.00	34.50	18.00	34.00
Cy'n'd, min. 21% N, c.l.	lb.	.02¼	.02¾	...	...	...	...
Gluconate, U.S.P., drs.	lb.	.57	.59	.57	.59	.57	.59
Phosphate, tri, bbls, cl.	lb.	...	.0635	...	.0635	...	.0635
Camphor, U.S.P., gran, powd, bbls	lb.	.69	.71	.69	.71	.69	.71
Carbon Bisulfide, 55-gal drs	lb.	.05	.05¾	.05	.05¾	.05	.05¾
Dioxide, cyl	lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, Zone 1, 52½ gal. drms	gal.	.73	.80	.69	.80	.73	.80
Casein, Acid Precip, bgs, 10,000 or more	lb.	...	.33	.24	.33	...	.24
Chlorine, cyls, lcl, wks, contract	lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract	lb.	...	.05¼	...	.05¼	...	.05¼
Liq. tk, wks, contract 100	lb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs	lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude	bbl.	8.25	8.75	8.25	8.75	8.25	8.75
Cobalt, Acetate, bbl	lb.	...	.83¾	...	.83¾	...	.83¾
Oxide, black kgs	lb.	...	1.84	...	1.84	...	1.84
Copper, metal	100 lb.	...	14.75	12.00	14.75	12.00	12.50
Carbonate, 52-54%, bbls.	lb.	.19½	.20½	.19½	.20½	.19½	.20½
Sulfate, bgs, wks cryst.	100 lb.	5.00	5.50	5.00	5.65	5.00	5.50
Copperas, bulk, c-l, wks	ton	...	14.00	...	14.00		14.00
Cresol, USP, drs	lb.	.11¼	.12¾	.10¾	.12¾	.10¾	.11¾
Dibutylamine, c-l, drs wks.	lb.	...	.66	...	.66	...	.66
Dibutylphthalate, drs	lb.	.2000	.2510	.1700	.2510	.1770	.2359
Diethylaniline, drs.	lb.	...	.40	...	.40	...	.40
Diethyleneglycol, drs, wks	lb.	.14	.15	.14	.15	.14	.15½
Dimethylaniline, dms,cl.,lcl	lb.	.21	.22	.21	.22	.23	.24
Dimethyl phthalate, drs	lb.	.20	.20½	.20	.20½	.20	.20½
Dinitrobenzene, bbls	lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms.	lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls	lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms	lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks.	lb.	.16	.20	.16	.20	.16	.20
Diphenylamine bbls	lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs	lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, tks, frt all'd	lb.	...	.1175	.0950	.1175	.0975	.1175
Chloride, drs	lb.	.18	.20	.18	.20	.18	.20
Ethylene Dichloride, lcl. wks, E. Rockies, dms.	lb.	.0891	.0941	.0842	.0941	.0842	.0941
Glycol, dms, cl.	lb.	...	.10	...	.10	...	.10
Fluorspar, No. 1, grd.95-98% bulk, cl-mines	ton	...	37.00	...	37.00	...	37.00
Formaldehyde, bbls, cl & lcl	lb.	.0520	.0570	.0520	.0570	.0520	.0570
Furfural tech, dms, c-l,wks	lb.	...	.13	...	.13	...	.13
Fusel Oil, ref'd, dms, dlvd	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Glauber's Salt, Cryst, c-l, bgs, bbls, wks	100 lb.	1.05	1.45	1.05	1.45	1.05	1.45
Glycerine dynamite, dms, c-l,	lb.	.17½	.18¼	.17½	.18¼	...	.16½
Crude Saponification, 80% to refiners tks	lbs.	...	.11½	...	.11½	.09½	.11½

GUMS

Gum Arabic, amber sorts bgs	lb.	.14¼	.14¾	.11¾	.14¾	.11	.13
Benzoin, artificial, cns.	lb.	1.00	1.70	.52	1.70	.52	1.00
Copal, Congo	lb.	...	no stocks	...	.55¾	...	.55¾
Copal, East India, chips	lb.	...	no stocks	...	.55¾	...	55¾
Macassar dust	lb.	...	no stocks	...	.07⅜	...	.07⅜
Copal Manila	lb.	.25	...	.13½	.25	.13½	.15½
Copal Pontianak, bold c-l	lb.	...	no stocks	...	.17¾	...	.23⅜
Karaya, bbls, bxs, dms.	lb.	.21	.50	.18	.50	.15	.46

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

AHCO PRODUCTS

METHYL "CELLOSOLVE"* STEARATE

METHYL "CELLOSOLVE" STEARATE, a synthetic ester, is used as a plasticizer for cellulose derivative, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula, $C_{17}H_{35}COOCH_2CH_2OCH_3$
Molecular weight 342
Color (platinum cobalt scale) 175
Melting point ..... 22° to 24°C
Flash point ..... 378°F
Acidity, less than .6 mg. KOH per gram ester
Specific gravity ..... .888 at 25°/25°C
Iodine value ..... 2 max.

Low volatility

* Trade mark of C&CCC

★

BUTYL STEARATE

BUTYL STEARATE, a synthetic ester, is used as a plasticizer for cellulose and polyvinyl derivatives, also for cosmetics, paper coatings and wax finishes. The following data may suggest other uses.

Chemical formula ..... $C_{17}H_{35}COOC_4H_9$
Molecular weight 341
Color (platinum cobalt scale) 130
Melting point ..... 19° to 20°C
Flash point ..... 358°F
Acidity, less than .6 mg. KOH per gram ester
Saponication number, 171-179 mg. KOH per gram ester
Specific gravity ..... .85-.86 at 20°/20°C
Iodine value ..... 2 max.

Low volatility

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Current Prices

Gums
Salt Lake

		Current		1946		1945	
		Low	High	Low	High	Low	High
Kauri, N. Y.							
Superior Pale XXX	lb.	...	nom.	...	.65¾	...	.65¾
No. 3	lb.	...	nom.	...	.22	...	.23
Sandarac, bgs.	lb.	.90	.95	.90	.99½	...	.99½
Tragacanth, No. 1, cases	lb.	5.00	5.25	3.75	5.25	3.80	5.00
No. 3	lb.	3.20	3.45	2.10	3.45	2.15	3.00
Yacca, bgs	lb.	...	nom.	.05	.07¼	.06	.07¼
Hydrogen Peroxide, cbys	lb.	.15½	.18½	.15½	.18½	.15½	.18½
Iodine, Resublimed, jars	lb.	1.75	1.85	1.75	1.85	1.75	2.10
Lead Acetate, cryst, bbls	lb.	...	.12½	...	.12½	...	.12½
Arsenate basic, bg, lcl	lb.	...	.14½	.12	.14½	.11½	.12
Nitrate, bbls.	lb.	...	.12½	...	.12½	...	.12½
Red, dry, 95% Pb_3O_4 bbls.	lb.	.10¾	.12½	.09	.13¾	.09	.10¾
97% Pb_3O_4, bbls delv.	lb.	.11	.12¾	.09½	.14½	.09½	.11¼
98% Pb_3O_4, bbls delv.	lb.	.11¼	.12¾	.08¼	.14½	.08¼	.08¾
White, bbls	lb.	.09¾	.10¼	.07¼	.11½	.07¼	.08
Basic sulfate, bbls, lcl	lb.	.08¾	.09¼	.07¼	.10¾	.07¼	.08
Lime, Chem., wks, bulk	ton	6.50	10.25	6.50	10.25	6.25	13.00
Hydrated, f.o.b. wks	ton	8.50	12.00	8.50	12.00	8.50	16.00
Litharge, coml, delv. bbls	lb.	.09¾	.11½	.08	.15¼	.08	.09¾
Lithopone, ordi., bgs	lb.	.0440	.0465	.04¼	.04¾	.04¼	.04¾
Magnesium Carb, tech, wks	lb.	.07¼	.10¾	.07¼	.10¾	.06¼	.10¾
Chloride flake, bbls, wks c-l	ton	...	32.00	...	32.00	...	32.00
Manganese, Chloride, Anhyd. bbls.	lb.	.14	.16	.14	.18	.15	.18
Dioxide, Caucasian bgs, lcl	ton	74.75	79.75	74.75	79.75	74.00	79.75
Methanol, pure, nat, drs gal *l*		.63	.73	.63	.73	.63	.76
Synth, drs cl	gal. *m*	.31	.38	.24	.38	.31	.38
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06	.07
C.P. 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½	.10½
Chloride, cyl	lb.	.32	.36	.32	.40	.32	.40
Ethyl Ketone, tks, frt all'd	lb.	...	.08	...	.08	...	.08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	...	.27
Naphthalene, crude, 74°, wks tks	lb.	.0275	.0325	.0275	.0325	...	.0275
Nickel Salt, bbls, NY	lb.	.13	.13¼	.13	.13½	.13	.13½
Nitre Cake, blk	ton	...	16.00	...	16.00	...	16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08	.09
Orthoanisidine, bbls	lb.	...	.70	...	.70	...	.70
Orthochlorophenol, drs	lb.	.25	.27	.25	.27	.25	.27
Orthodichlorobenzene, drms	lb.	.07	.08	.07	.08	.07	.08
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.18	.15	.18
Orthonitrotoluene, wks, dms	lb.	...	.09	...	.09	...	.09
Paraldehyde, 98%, wks lcl	lb.	...	.12	...	.12	...	.12
Chlorophenol, drs	lb.	.24	.27	.24	.27	.25	.32
Dichlorobenzene, wks	lb.	.11	.15	.11	.15	.11	.15
Formaldehyde, drs, wks	lb.	.21	.22	.21	.22	.21	.22
Nitroaniline, wks, kgs	lb.	.41	.43	.41	.45	.43	.45
Nitrochlorobenzene, wks	lb.	...	.15	...	.15	...	.15
Toluenesulfonamide, bbls	lb.	...	.70	...	.70	...	.70
Toluidine, bbls, wks	lb.	...	.48	...	.48	...	.48
Penicillin, ampules per 100,000 units		...	.48	.48	.95	.59	2.40
Pentaerythritol, tech	lb.	.27	.31	.27	.31	.27	.33
PETROLEUM SOLVENTS AND DILUENTS							
Lacquer diluents, tks, East Coast	gal.	...	.12	.11½	.12	...	.11
Naphtha, East tks, wks	gal.	...	.11½	.11	.11½	...	.11
Rubber solvents, East, tks, wks	gal.	...	.11½	.11	.11½	...	.11
Stoddard Solvents, East, tks, wks	gal.	...	.10½	.10	.10½	...	.10
Phenol, U.S.P., drs	lb.	.10½	.12½	.10½	.13	.10½	.11¼
Phthalic Anhydride, cl and lcl, wks	lb.	.13	.14	.13	.14	.13	.14
Potash, Caustics, 88-92%, wks, sol.	lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
Flake, 88-92%	lb.	.07	.07½	.07	.07½	.07	.07½
liquid, 45% basis, tks	lb.	...	.02⅞	...	.02⅞		.0275
dms, wks	lb.	.03¼	.03½	.03	.03½	.03	.03½
Carbonate, hydrated 83-85%	lb.	...	.05½	...	.05½	.05½	.05¾
Chlorate crys, kgs, wks	lb.	.11	.13	.11	.13	.11	.13
Chloride, crys, tech, bgs, kgs	lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriatic dom, 60-62-63% K_2O bulk unit-ton	ton	.53½	.56½	.53½	.56½	.53½	.56
Permanganate, USP, wks dms	lb.	.20½	.21	.20½	.21	.20½	.21
Sulfate, 90%, basis, bgs	ton	36.25	39.25	36.25	39.25	...	36.25
Propane, group 3, tks	gal.	...	.03¾	...	.03¾	...	.03¾
Pyridine, ref., drms	lb.	.45	.45½	.45	.45½	.45½	.46
R Salt, 250 lb bbls, wks	lb.	...	.65	...	.65	...	.65
Resorcinol, tech, drms, wks	lb.	.64	.74	.64	.74	.64	.75
Rochelle Salt, cryst	lb.	.38½	.42	.38½	.47	.43½	.47
Salt Cake, dom, blk wks	ton	...	15.00	...	15.00	...	15.00

l Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ½c higher.

	Current Low	Current High	1946 Low	1946 High	1945 Low	1945 High
Saltpeter, grn, bbls. ..100 lb.	8.20	9.00	8.20	9.00	8.20	8.60
Shellac, blchd. bone dry, bbls. .....lb.	.69½	.73½	.42½	.73½	.42½	.46
Silver Nitrate, 100 oz, bots 2,500-oz. lots .....oz.	.58¼	.59	.47	.59	.47	.47¾
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl....100 lb.	1.05	1.18	1.05	1.18	1.05	1.13
Caustic, 76% flake drms, cl .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms,cl 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks .....100 lb.	...	1.95	...	1.95	...	1.95
Sodium Acetate, anhyd. dms .....lb.	.08½	.10	.08½	.10	.08½	.10
Benzoate, USP dms ....lb.	.46	.52	.46	.52	.46	.52
Bicarb, tech., bgs., cl., works .....100 lb.	1.55	1.90	1.55	1.90	1.55	1.90
Bichromate, bgs,wks l.c.l. lb.	.07⅞	.08¼	.07⅞	.08⅛	.07½	.08⅛
Bisulfate powd, bbls, wks .....100 lb.	3.00	3.60	3.00	3.60	3.00	3.60
35° bbls., wks .....100 lb.	1.40	1.65	1.40	1.65	1.40	1.65
Chlorate, kgs, wks c.l....lb.	...	.06½	...	.06¼	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14½	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	.07¼	.08¼
Hyposulfite, cryst, bgs, cl, wks .....100 lb.	...	2.25	...	2.25	...	2.25
Metasilicate, gran, bbl, wks c-l .....lb.	...	2.50	...	2.50	...	2.50
Nitrate, imp, bgs .....ton	...	38.50	33.00	38.50	...	33.00
Nitrite, 96-98% bbl. cl. lb.	...	.06¾	...	.06¾	...	.06¾
Phosphate, di anhyd. bgs. wks. .....100 lb.	6.00	6.75	6.00	6.75	6.00	7.25
Tri-bgs, cryst, wks 100 lb.	2.70	3.10	2.70	3.10	2.70	3.45
Prussiate, yel, bbls. wks lb.	...	.11	...	.11	...	.11
Silicate, 52°, drs, wks 100 lb.	1.40	1.80	1.40	1.80	1.40	1.80
40°, drs, wks, c-l 100 lb.	...	.80	...	.80	...	.80
Silicofluoride, bbls NY .lb.	.06½	.07½	.06½	.10	.06½	.10
Sulfate tech, Anhyd, bgs .....100 lb.	1.70	2.20	1.70	2.20	1.70	2.20
Sulfide, cryst c-l, bbls, wks .....100 lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, wks .....lb.	3.15	3.90	3.15	3.90	3.15	3.90
Starch, Corn, Pearl, bgs .....100 lb.	...	6.171	4.97	6.271	...	4.08
Potato, bgs, cl .....lb.	.07¼	.07½	.14	.18	...	.0637
Rice, bgs .....lb.	no stocks		no stocks		no stocks	
Sweet Potato, bgs .....lb.	no stocks		no stocks		no stocks	
Sulfur, crude, mines ....ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs .....lb.	.18	.36	.18	.36	.18	.30
Roll, bbls .....100 lb.	2.40	2.90	2.40	2.90	2.40	2.90
Sulfur Dioxide, liquid, cyl lb.	.07	.08	.07	.08	.07	.09
tks. wks .....lb.	...	.04	...	.04	...	.04
Talc, crude, c-l, NY ....ton	...	13.00	...	13.00	...	13.00
Ref'd, c-l, NY .....ton	13.00	21.00	13.00	21.00	13.00	21.00
Tin, crystals, bbls, wks. ..lb.	no stocks		no stocks		no stocks	
Metal .....lb.	...	.52	...	.52	...	.52
Toluol, drs, wks .....gal.	...	.27	.27	.32	...	.33
tks, frt all'd .....gal.	...	.22	.22	.27	...	.28
Tributyl Phosphate, dms lcl, frt all'd .....lb.	...	.49	...	.49	...	.47
Trichloroethylene,dms,wks lb.	.08	.09	.08	.09	.08	.09
Tricresyl phosphate tks ...lb.	...	.24	...	.24	...	.24
Triethylene glycol, dms....lb.	.18½	.19½	.18½	.19½	.18½	.19½
Triphenyl Phos, bbls .....lb.	.31	.32	.26	.32	.26	.31
Urea, pure, cases .....lb.	...	.12	...	.12	...	.12
Wax, Bayberry, bgs .....lb.	no stocks		no stocks		no stocks	
Bees, bleached, cakes ..lb.	.68	.70	.60	.70	no-stocks	
Candelilla, bgs crude ..lb.	.78	.80	.62	.80	.35	.36
Carnauba No. 1, yellow, bgs, ton .....lb.	2.00	2.03	1.80	2.03	no stocks	
Xylol, Indus. frt all'd, tks, wks .....gal.	...	.26	...	.26	...	.27
Zinc Chloride tech fused, wks .....lb.	.05	.0535	.05	.0535	.05	.0535
Oxide, Amer, bgs, wks lb.	.08½	.08¾	.07	.08¾	.07	.07½
Sulfate, crys, bgs...100 lb.	3.40	4.15	3.40	4.15	3.40	4.15

OILS AND FATS

Babassu, tks, futures .....lb.	...	.12	.11	.12	...	.111
Castor, No. 3, bbls .....lb.	...	.18½	.13¾	.18½	.13¾	.14¼
China Wood, drs, spot NY lb.	.39	.41	.39	.41	.39	.41
Coconut, edible, drs NY...lb.	...	.0985	...	.0985	...	.0985
Cod Newfoundland, dms..gal.	.88	.90	.88	.90	.85	.90
Corn, crude, tks, wks ....lb.	...	.12¾	...	.12¾	...	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.1880	.1680	.1880	...	.1550
Menhaden, tks	.1220	nom.	.1220	.1225	...	.1225
Light, pressed, drs l.c.l lb.	.1300	nom.	.1300	.1620	...	.1300
Palm, Niger, dms .....lb.	...	.0865	...	.0865	...	.0865
Peanut, crude, tks, f.o.b. wks .....lb.	.12⅞	.13⅞	.12⅞	.13⅞	.12⅞	.13⅞
Perilla, crude dms, NY ..lb.	no stocks		no stocks		no stocks	
Rapeseed, New Orleans, bulks .....lb.	...	.13	...	.13	...	.156½
Red, dms .....lb.	.13¼	.14¼	.13¾	.14¼	.12¾	.14¼
Soy Bean, crude, tks, wks lb.	...	.1175	.1175	.15	...	.1175
Tallow, acidless, bbls..... lb.	...	.09⅝	...	.14¼	...	.14¼

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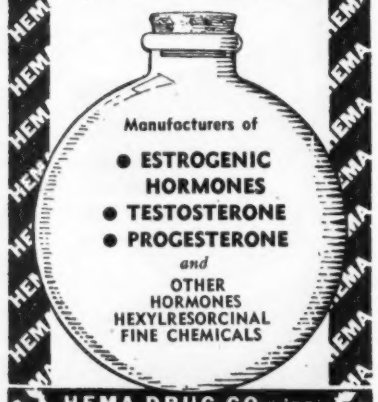

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5—Vacuum Pans, 4', 5', 6', 7' dia.
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3—Sharples No. 6 Centrifuges.
2—Buflovak 6' dia Vacuum Crustallizers.
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1—COLTON #3 Rotary Wet Granulater, M.D.
1—COLTON Gear-Type Tube Filler

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The Engineer will be required to co-operate with the designers and subsequently to assist in the erection and early operation of a plant to be built in Australia.

The engagement will be for a limited period, probably until six months after the plant is in successful operation, but not less than two years from date of appointment. The appointment will not be made before January 1st, 1947.

Liberal salary and traveling expenses will be paid to the successful applicant. Under present Australian law, remuneration earned by a non-Australian appointee, if taxable in the country of his domicile, will be exempt from Australian income tax.

Applications which will be treated as confidential should be addressed in the first instance to:—

First Secretary,
Australian Embassy,
Washington, D. C.

and should state age, training, degrees held, experience, war-service and salary required. Copies only of references should be forwarded. Only applicants with an intimate knowledge of alumina and aluminum production will be considered.

Applications will close on October 31st, 1946.

Chemical Engineer desired by established Philadelphia firm manufacturing industrial organic products. Must be capable of taking charge of plant, future pilot plant operations and production. Experience in organic chlorinations desired. Marvelous opportunity for promotion and salary increases. In reply please give age, references, salary expected and summary of past experiences. Replies confidential. Box 3048, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

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Southwest Laboratory wants franchise on plastic materials in territory. John T. Mays Laboratories. Box 1685, Fort Worth, Texas.

For Chemists, Chemical and Metallurgical Engineers, write Chemical Department, Position Securing Bureau (Agency), 45 John Street, New York. Telephone COrtland 7-9650.

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EXPLOSIVES

(*Continued from page 649*)

Army production of propellant and explosive powders at eleven Army and twenty-one civilian plants working at least part time on Army contracts. Tables IV and V list plants producing explosives for the Navy and Army respectively.

HIGH EXPLOSIVES

The Japanese used a great deal of trinitroanisol and hexanitrodiphenylamine both of which are generally considered to be too deleterious to the workers' health for manufacture in the United States. The Japanese had not developed new methods to protect their workers, but continued to manufacture trinitroanisol and hexanitrodiphenylamine. Japanese stated that most workers, after the first attack, enjoyed a certain degree of immunity from dermatitis.

The introduction of aluminum into explosives had been under investigation for some time and such compositions as Type A with 60% TNT or sometimes TNA, 24% HNDA and 16% aluminum had been proposed for use in torpedo war heads but had not been accepted. Type 2 explosive with 30% aluminum and 70% TNA had been used as an incendiary explosive in submarine gun shells.

Of relatively recent interest were the K Type explosives consisting of inorganic salt mixtures such as ammonium perchlorate, ferrosilicate and organic material, ammounim perchlorate and organic material and sodium chlorate with organic material.

The most powerful underwater explosive as indicated by underwater tests on compartment bulkheads was said to be explosive type 94 (60% TNA and 40% trimethylene trinitramine). In the air the most powerful explosive was said to be 50% TNT and 50% Pentralite, $C(CH_2NO_3)_4$ although it was not much different from Type 94. For torpedo warheads Type 94 was abandoned because of its sensitivity and susceptibility to sympathetic detonation.

The principle explosives used by the Japanese navy were trinitroanisole, trinitrotoluene, tetranitromethyl aniline, trimethylene trinitramine, hexanitrodiphenylamine, tetranitropentaerythrite or combinations of these.

The Third Naval Powder Factory at Maizuru, although one of the three main naval powder manufacturing centers, did not have a very great capacity as is shown by Table VI or very modern or efficient equipment. Much corrugated metal shed type of construction was used.

To further illustrate how small the output of Japanese explosives and propellant plants was, compared to that of similar American plants, we may consider the Taketoyo Factory of the Nisson Chemical Industrial Company, (Table VII). This privately owned stock corporation was established in 1919 and was capitalized at 67,500,000 yen. The Taketoyo Factory supplied the Navy with cannon, machine gun and rocket propellant powder as well as explosives. The maximum number of personnel employed reached 2310 on Feb., 1945.

During the war Japan experienced considerable difficulty manufacturing adequate supplies of ammunition, due mainly to a lack of such raw materials as nitric acid during the latter part of the war. The Japanese Navy did not import or export any appreciable amount of explosives during war, but 3,000 tons of captured explosives were reprocessed at Maizuru.

Packaging Liaison Between U. S. A. and Britain

Consolidation of research facilities between two leading professional associations in Great Britain and the United States was announced recently when directors of the Packaging Institute voted approval of an exchange of technical research data with the Printing and Allied Trades Research Association, London.

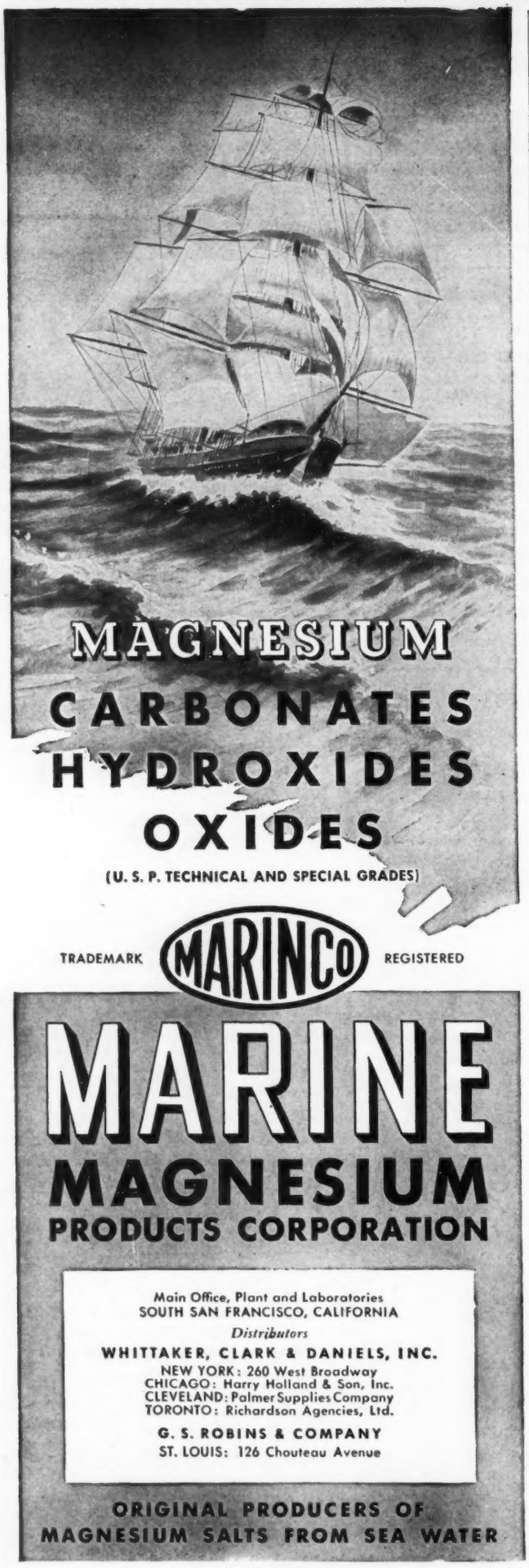
"PATRA", as the British group is abbreviated, through its packaging division, maintains laboratories and library facilities to advance Britain's technical studies in all phases of metal, paper, glass, and synthetic materials. A recent grant of the British government will soon see this facility expanded.

The Packaging Institute, comprising approximately four hundred American and Canadian firms manufacturing packaging materials and machinery, including a large number of leading package users in the foods, pharmaceuticals, drugs, cosmetics and tobacco fields, does not maintain its own laboratory, conducting research through committees and advisor boards of both producers and users.

The Viscount Portal heads PATRA. Walton D. Lynch, vice-president of National Folding Box Co., is president of the Packaging Institute. Technical committee chairman of the latter organization is Charles A. Southwick, Jr., Shellmar Products Co., of which committee F. S. Leinbach, Riegel Paper Co., is vice chairman, and Roger V. Wilson, Continental Can Co., Herbert H. Barnby, Owens-Illinois Glass Co., Carl Hartmann, St. Regis Paper Co., A. F. Wendler, E. I. du Pont du Nemours & Co., John Tindal, Package Machinery Co., A. B. Crowell, Union Paste Co., Carl Prindle, The Dobeckmun Co., W. H. Graebner, Menasha Products Co., Walter T. Ritter, Chicago Carton Co., Glenn Mather, Container Co. Division, Continental Can Co., are members.

Rheem Enters Far East

Rheem Manufacturing Company has formed an association with Hume Pipe Far East, Ltd., to operate a steel shipping container plant at Singapore, Malay Peninsula, for the petroleum, latex and palm oil industries.



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"WE"— EDITORIALLY SPEAKING

WHEN IT WAS DECIDED to nickname atomic bomb No. 5 "Helen of Bikini" in honor (or disparagement) of Helen of Troy, who, you may remember, launched a thousand ships, it was further suggested by Bradley Dewey, American Chemical Society president and member of the Joint Chiefs of Staff Evaluation Board for Operation Crossroads, that the watertight caisson around the bomb be called Moby Dick "so we can say 'thar she blows.'"

NOT LONG AGO we published an article on a new cheap oxygen process, and now we've found a market for the oxygen. A note which came to our desk says that nine parts of oxygen mixed with one part of carbon dioxide cures hangovers in 20 minutes.

WE LEARNED from a recent bulletin put out by Celanese that "toidy seats" for little "citizens" are now being molded from Lumarith. What especially tickled us, though, was the name of the column where the item appeared. You've guessed it: "End Uses".

WILL CHEMISTRY HELP ERASE the color line? With the suntan lotion and ultra-violet manufacturers striving to make the light folks darker, we now have a report on a new bleaching cream which "has a definite, measurable effect" in making dark or tan skin lighter. One group of Negro subjects showed a lightening effect of "8½ shades," it is claimed.

If only someone would concoct a pill or cream or something now that would banish animosity, fear and suspicion, we might be able to make this old world a pleasanter place to live.

WE HAVE A VERY CONVENIENT and infallible method of telling when a problem in the chemical industry reaches crisis proportions. When the *New Yorker* calls us about it, we know it is really hot.

Last week the *New Yorker* called about soda ash. Said they'd heard there was a shortage or something. Could we give them some information?

P. S. We did!

FIFTEEN YEARS AGO

(From Our Files of October, 1931)

H. L. Derby is re-nominated for a directorship in the National Association of Manufacturers.

W. D. Huntington, chairman of the executive committee of the Manufacturing Chemists' Association and vice-president of Davison Chemical Co., tells President Hoover that the chemical industry is expected to adopt the six-hour day with present hourly wage rates maintained, resulting in an increase of employment by approximately one-third.

Karl T. Steik, recently of the Standard Oil Development Co., is appointed research director at the new main laboratories of National Oil Products at Harrison, N. J.

Grasselli Medal will be presented to L. V. Redman at a joint meeting of the Society of Chemical Industry, N. Y. section A. C. S., American Electrochemical Society and Societe de Chimie Industrielle, Nov. 6.

Monsanto inaugurates a new idea in the adoption of white garb (shirts and slacks) at Plants "A" and "B" to give manufacturing and chemical control and research departments an added appearance of neatness and efficiency.

Procedure relating to permit control of industrial alcohol and other nonbeverage liquors is outlined in a publication by James M. Doran, Commissioner of Industrial Alcohol in the Treasury Department.

Al Alvarez, of Grasselli, again wins the golf championship of the chemical industry at the annual tournament of the Salesmen's Association held at Briarcliff Lodge.

THIRTY YEARS AGO

(From Our Files of October, 1916)

General Chemical acquires eighteen acres on the south side of Chicago for a new plant.

Readjustment of the financial affairs of American Dyewood Co. is further effected by organizing of the United Dyewood Corp.,

Dye plants of the Oakes Mfg. Co., Long Island, are destroyed with loss of seven lives.

Connecticut Chemical Co., Canaan, Conn., is incorporated to manufacture acetate of lime.

SCIENCE MARCHES ON! The packing houses may soon have to revise their old wag about using everything but the squeal of the pig. Last month in Chicago, an American Chemical Society author announced a use for mouse squeaks. It should be but a step to pig squeals.

It seems that the wee mousie's cries when an electric shock is passed through its tail are used to measure the strength of pain-relieving drugs. We can see the advertising headlines now: "Get rid of that headache with *Wham*—scientifically compounded for lowest squeak rating."

"SILVER MINED from Surplus Property" might well title a recent news note. For it seems that the seawater desalting kits made for the Army during the war not only contain an ion exchanger but very appreciable quantities of that 90¢ an ounce material, silver.

The number of men around trying to buy the 235,000 kits at 5—40¢ each, aroused the suspicions of one of the WAA officials. Net result: a chemical analysis by the Bureau of Mines revealed that each kit contained a neat $4.00 worth of silver.

We can't help but wonder just why WAA had to have a Bureau of Mines analysis made. We are assigning this to our file for the "Raised Eyebrow Department."

FOR SOME YEARS PAST we have smarted from the sharp rebukes—and reverses—we received in our Latin-studying days. We tremble inwardly whenever we meet our Latin professor. But now we have made a startling discovery. Henceforth we will stand before him with the gleam of achievement in our eye.

It all happened this way. Today we have a train to catch, and the clock has received more than its usual quota of attention. And, lo and behold, we find that four o'clock is designated as IIII—whereas, smugly, we recall that the true Roman system calls for IV. Proud of our observation we have scurried out to look at other clocks—and they are all thus in error.

What matters that we have missed our train? Our ego, sir, has been bolstered.

WHEN A SILK purse *was* made from a sow's ear we weren't fazed, but the current ado about making textiles from chicken feathers is too much.

We stumble form our corner feeling that life is getting just too complex.

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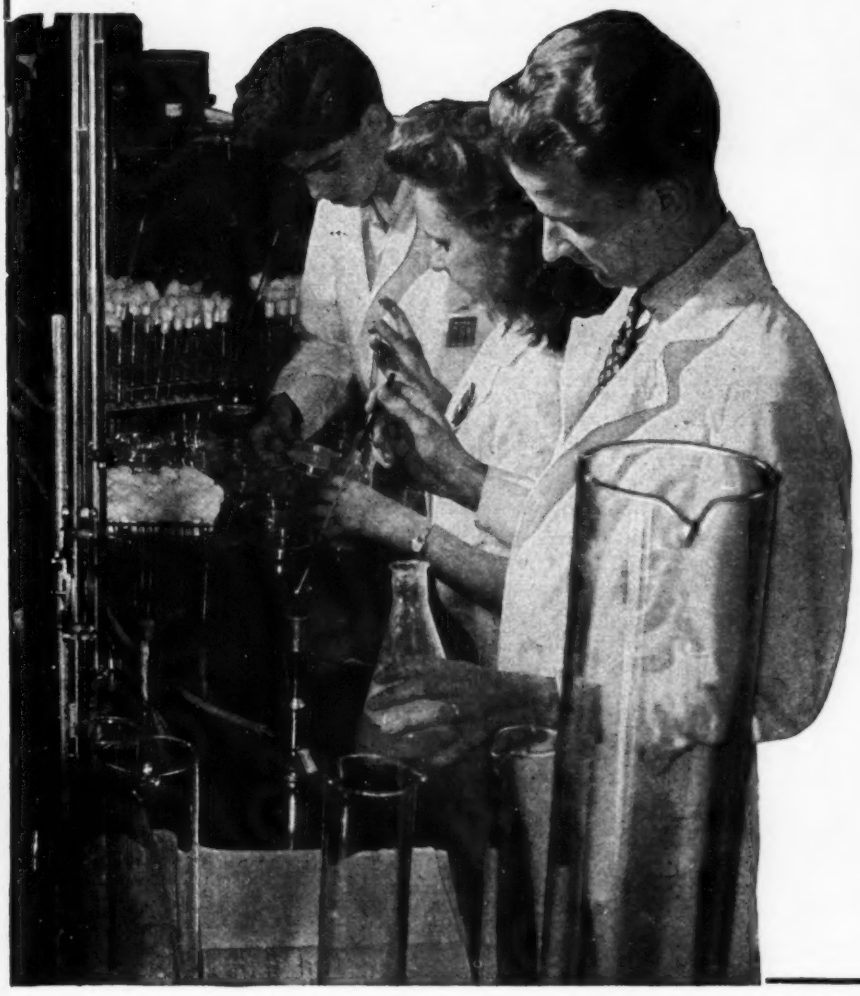

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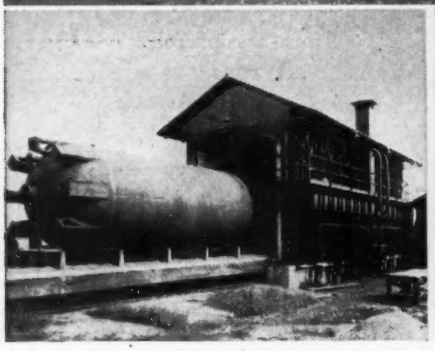

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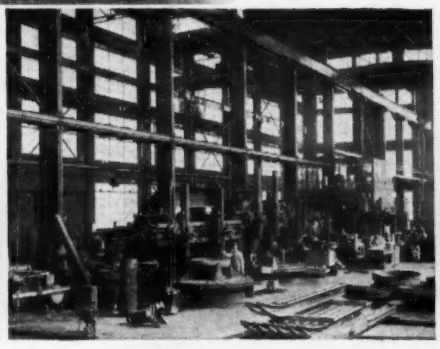

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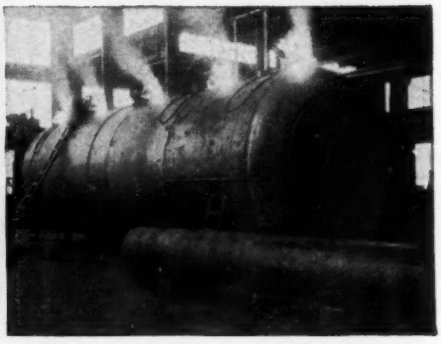

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Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 587, Nos. 2, 3, 4—Vol. 588, No. 1 (June 11—July 2)—p. 711

* *Specialties*

Filled asphalt comprising oxidized asphalt having ball and ring softening point of 190° to 205° F. and mineral filler and kiln dried diatomaceous earth whose diatoms are of elongated type. No. 2,400,563. Francis Mark.

Elasto-plastic sash glazing composition having good adhesion to wood, glass and metal, said glazing composition comprising reclaimed rubber, wood rosin, cumar, powdered whiting and asbestos fiber, dispersed in hydrocarbon solvent. No. 2,400,565. Grant Merrill to Minnesota Mining & Manufacturing Co.

Non-aqueous composition inhibiting corrosion of metal surfaces comprising compound containing phosphorus having oil-solubilizing organic radicle with separate organic derivative of phosphorus-free inorganic acid, in oil vehicle. No. 2,400,573. Carl Prutton, one-half to Albert Smith.

Anti-rust turbine oil comprising mineral lubricating oil and to retard corrosion of metal, an oil-soluble composite improvement agent, being homogenous blended mixture of polyvalent metal salt of N-alkyl phthalamidic acid and amine addition salts of 3-methyl-butyl, 2-ethyl-hexyl phosphoric acid with primary fatty amines and secondary cyclo-hexyl amines. No. 2,400,611. Herschel Smith and Troy Cantrell and John Peters to Gulf Oil Corp.

Liquid adhesive composition comprising plastic polymerized chloroprene dissolved in organic solvent, said composition containing polyvinyl acetate in solution to impart initial tackiness to mixture. No. 2,400,612. Stanley Sprague to B. B. Chemical Co.

Preparing agent for absorption of poisonous gases including phosgene which comprises: forming alumina hydrogel by bringing together aqueous dispersion of alumina sol, aluminum oxide, and solid hexamethylene tetramine, etc. No. 2,400,709. Walter Patrick, Jr. to The Davison Chemical Corp.

Preparing stable, modified starch paste which comprises making aqueous paste of water-soluble, partially hydrolyzed starch, adding to paste a water-soluble condensate of urea, melamine, and formaldehyde. No. 2,400,820. Sivert Glarum and Joseph Thomas to Rohm & Haas Co.

Algaecide comprising mixture of water soluble inorganic copper salt and inhibitor of reaction between copper salt and alkaline aqueous solution comprising water soluble salt of an aliphatic hydroxy acid. No. 2,400,863. Max Gelfand.

Treating detergent selected from soap and non-soap type detergents to facilitate partitioning thereof. No. 2,400,871. John Bodman and Fred Pease to Lever Brothers Co.

Thermo-setting plastic composition for molding a lightweight heat insulating material comprising aqueous mixture of calcium oxide, silica, bentonite, and asbestos fibres, with addition of sodium silicate and plaster of Paris to pre-set composition in mold. No. 2,400,884. Hubert Lloyd to The Ruberoid Co.

Controlling expansion in plaster of Paris mold or core which includes adding alkali metal aluminate to dry plaster mix. No. 2,400,905. Xarifa Bean to Antioch College; Morris Bean, Xarifa Bean, Algo Henderson, Arthur Morgan and William Beatty.

Phosphor comprising matrix of material of group of cadmium borate and cadmium silicate activated with color-determinative activator of fluorescence and cooperating phosphorescence-prolonging activator material of bismuth and tin, and characterized by visible fluorescence with pinkish after phosphorescence under both ultraviolet and cathode ray excitations. No. 2,400,925. Wayne Graff to General Electric Co.

Remoistening gummed paper product comprising paper sheet, and layer of dry remoistening adhesive on sheet, sheet and adhesive being provided with plurality of capillary apertures extending therethrough, adhesive adjacent apertures being slightly raised above surface of layer to act as treat to aid pick up of moisture from moistening surface. No. 2,400,995. Ferdinand Humphner to Mid-States Gummed Paper Co.

Liquid adhesive composition comprising plastic polymerized chloroprene and zinc-calcium resinate. No. 2,401,015. John Perkins to B. B. Chemical Co.

Dry rosin size composition readily dispersible in water to provide aqueous sizing dispersion containing high proportion of free rosin, comprising solidified product of homogenous mixture consisting of molten rosin, a water- or alkali-soluble protective colloid, and rosin of a water-soluble alkali metal alkali. No. 2,401,090. Robert Mashburn to Hercules Powder Co.

Abrasive article comprising abrasive particles bonded by water-free and unswelled reaction product of aminated phenolic resin and resin-hardening resin-solvent agent that is halide and capable of reaction with resin polymer at amino groups. No. 2,401,138. Loring Coes, Jr. to Norton Co.

Mineral oil composition comprising viscous mineral oil and in admixture an oil-soluble metal hydrosulfide of a basic polyvalent-metal salt of an alkyl-substituted aromatic hydrocarbon compound, said alkyl substituent being oil-solubilizing alkyl group. No. 2,401,273. Orland Reiff and Donald Andrus to Socony-Vacuum Oil Co. Inc.

Making plastic name-plates having area of color contrasting with that of plate which consists in, masking predetermined area with masking material which is soluble in mask removing medium, coloring name-plate with coloring medium, etc. No. 2,401,306. Louis Lavallee.

Manufacturing multi-ply resinforced asbestos paper sheets comprising, successively transferring to felting surface from aqueous furnish wet webs of asbestos fibers lightly sized with oxidized starch gum, interposing between two successively deposited webs of asbestos a reinforcing scrim having mesh openings, etc. No. 2,401,314. Robert Quinn to Johns-Manville Corp.

* *Continued from Vol. 586, Nos. 2, 3, 4, Vol. 587, No. 1.*
(*Continued on page 768*)

Patents Available for License or Sale

The Patent Office is regularly publishing a Register of Patents Available for Licensing or Sale. Patents concerning chemical products and processes appear below.

August 20, 1946

Pat. 2,154,632. **Seal.** Patented Apr. 18, 1939. Prevents the escape of gases or fluids from the joint between a rotating furnace and an adjacent stationary part. A fin extending around rotating part fits into a channel carried by the associated stationary part. A gasket incompletely fills the channel so that external fluid pressure may be applied to balance internal pressure. Dust and other solid particles may be removed from the seal by a tube which conveys falling particles into a liquid bath, thus preventing wear. (Owner) Louis Stern, 159 West 25th St., New York 1, N. Y. Groups 32—93; 33—12. Reg. No. 3,332.

Pat. 2,287,218. **Antifouling Composition.** Patented June 23, 1942. Group 28—11. Reg. No. 3,338.

Pat. 2,389,229. **Antifouling Composition.** Patented Nov. 20, 1945. Group 28—11. Reg. No. 3,339.

Pat. 2,390,408. **Antifouling Composition.** Patented Dec. 4, 1945. Group 28—11. Reg. No. 3,340.

Pat. 2,398,069. **Antifouling Composition.** Patented Apr. 9, 1946. Group 28—11. Reg. No. 3,341.

The four patents listed above relate to non-corroding compositions which upon application to surfaces of structures submerged in sea water (ship hulls, pier supports, flying boat hulls and pontoons) prevent fouling by barnacles, seaweed, and other marine organisms. Patent 2,287,218 recites a mixture of toxic agents, such as thymol and copper linoleate and a phenolic varnish, dispersed in suitable organic solvents. In Patent 2,389,229 the combination consists of an ester gum varnish and phenyl mercuric acetate in a mixed solvent. The toxic agent used in Patent 2,390,408 may be a mercury derivative of pyridine. Patent 2,398,069 is a continuation-in-part of Patent 2,287,218, the toxic condensation product being a mixture of a saturated aldehyde such as formaldehyde and an unsaturated aldehyde such as cinnamic aldehyde. These compositions may be employed as clear lacquers or they may be pigmented with aluminum powder or the usual dyes. Modifications shown in each patent. (Owner) Stoner-Mudge, Inc., 200 Westhall St., Pittsburgh 12, Pa.

Pat. 2,212,314. **Water Resistant Amylaceous Compositions.** Patented Aug. 20, 1940. Prepared by the reaction between an amylaceous substance, formaldehyde and an acid, the composition forms a clear waterproof and water resistant film which dries without the application of heat. The composition is insoluble in most organic solvents such as acetone and chloroform and may be used to impregnate the surface of wood, paper, fabric, and other materials. Examples given in patent. (Owner) Stein, Hall & Co., Inc., 285 Madison Ave., New York, N. Y. Group 28—31. Reg. No. 3,281.

August 27, 1946

Pat. 2,399,111. **Trap.** Patented Apr. 23, 1946. For separating liquid from steam. Moisture-laden steam enters body of trap through an inlet and strikes a baffle so that moisture is precipitated. Air trapped within a floating bell causes a lever to lift a pair of valves so that the liquid flows outwardly through pipe at bottom of casing. When level of liquid drops to predetermined point, bell resumes its normal position and the valves are closed. By simple adjustment the trap may be used as a means for controlling the level of a liquid in a container. (Owner) Charles E. George, Sr., 109 Lynn St. S., Charleston 3, W. Va. Group 33—66. Reg. No. 3,388.

September 3, 1946

Pat. 2,004,337. **Fluid Pump.** Patented June 11, 1935. For use in oil or gas wells. Comprises a tubular shell adapted to be attached to the end of a length of pipe and lowered into well. Shell has upper and lower partitions with balls seating over openings in the partitions forming check valves. A pipe extending downwardly into the shell is connected to upwardly directed nozzles, the mouths of which are beneath the upper check valves. An operating fluid introduced under pressure into the pipe flows in streams from the nozzles, striking and opening the upper valves allowing the operating fluid to pass which carries some of the fluid to be pumped with it. The upper check valves also act as mixing valves causing both fluids to be thoroughly mixed together. (Owner) Mrs. J. W. Murphey, 1012 Jackson St., Monroe, La. Group 35—32—61. Reg. No. 3,408.

(*Continued on following page*)

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Pat. 2,347,469. Pipe Coupling. Patented Apr. 25, 1944. Group 35—69. Reg. No. 3,413.

Pat. 2,396,163 Pipe Coupling. Patented Mar. 5, 1946. Group 35—69. Reg. No. 3,414.

The two preceding patents relate to couplings for threadless pipes designed to withstand high pressure and vibration without danger of leakage or loosening of the joint. In Patent 2,347,469 the inside of the coupling is tapered and smooth and the end of the pipe is correspondingly tapered to fit therein. The pipe in back of the taper has a ring positioned in a circumferential groove. A flanged nut or ferrule cap encircling the pipe is threaded on the outside of the coupling, the flanges engaging the ring to force the tapered portions into tight sealing engagement. In Patent 2,396,163 a tapered malleable bushing having a flanged outer end is utilized. The end of the pipe is of reduced diameter and has a number of circumferential grooves. When the flanged nut is threaded on the coupling it exerts pressure on the bushing to bind it between the pipe and coupling causing the metal of the bushing to crowd into the grooves of the pipe, the flange of the bushing being simultaneously clamped between the end of the coupling and flanged nut. (Owner) Charles A. Dies, 4810 North Christiana, Chicago 25, Ill.

The following patent, owned by the United States Government, as represented by the Secretary of the Interior, is available for licensing, upon a non-exclusive, royalty-free basis:

Pat. 2,403,481. Method of Concentrating Iron Ore. Patented July 9, 1946. (Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757.) The preparation for smelting of iron ores containing siliceous gangue materials may consist of conditioning a watery pulp of the ground ore with hydrated lime to establish a pulp with an alkalinity of pH 11. Soda ash is then added to precipitate the dissolved hydrated lime so that not more than 100 parts per million of the hydrated lime remains in solution. Lignin sulphonate is then added and the pulp subjected to agitation and aeration in the presence of an anion active collecting agent (resin acid, mixtures of resin and fatty acids, etc.) The gangue is floated and the concentrated iron ore settles and is recovered. Other examples given in patent. Group 32—95. Reg. No. 3,392.

September 10, 1946

Petrolite Corporation, Ltd., has entered, on the Register of Patents Available for Licensing, the following United States Letters Patent, relating to the resolution, demulsification, breaking, or treatment of petroleum emulsions, cut oil, roily oil, bottom settlings, basic sediment, BS, and the like, by the use of chemicals as set forth in said patents. Licenses will be granted under the aforesaid Letters Patent upon the terms and conditions of the Standard License Agreements at the time in effect, copies of which may be obtained from Petrolite Corporation, Ltd., 937 Pacific Ave., Webster Groves 19, Mo. Group 29—11. Reg. Nos. 3,415 to 3,740, inclusive.

Pat. 1,747,119. Process and Product for Treating Emulsions of Mineral Oils. Patented Feb. 11, 1930

Pat. 1,747,987. Art of Treating Emulsions. Patented Feb. 18, 1930.

Pat. 1,758,802. Process of Resolving Oil Emulsions and Reagents Therefor. Patented May 13, 1930.

Pat. 1,766,057. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,058. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,059. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,060. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,061. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,062. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,063. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,064. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,065. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,066. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,067. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,766,112. Process for Breaking Petroleum Emulsions. Patented June 24, 1930.

Pat. 1,771,096. Process of Resolving Emulsions. Patented July 22, 1930

Pat. 1,780,343. Process for Breaking Pertoleum Emulsions. Patented Nov. 4, 1930.

Pat. 1,780,344. Process for Breaking Petroleum Emulsions. Patented Nov. 4, 1930.

Pat. 1,780,345. Process for Breaking Petroleum Emulsions. Patented Nov. 4, 1930.

Pat. 1,802,090. Process for Breaking Petroleum Emulsions. Patented Apr. 21, 1931.

Pat. 1,812,393. Process for Breaking Petroleum Emulsions. Patented June 30, 1931.

Pat. 1,829,205. Method of Treating Oil-Water Emulsions. Patented Oct. 27, 1931.

Pat. 1,834,940. Process for Conditioning Petroleum Oils. Patented Dec. 8, 1931.

Pat. 1,837,130. Treatment of Oil and Water Emulsions. Patented Dec. 15, 1931.

Pat. 1,842,934. Process for Breaking Petroleum Emulsions. Patented Jan. 26, 1932.

Pat. 1,858,186. Method of and Reagent for Treating Wet Oils. Patented May 10, 1932.

Pat. 1,863,143. Method of Treating Wet Oils. Patented June 14, 1932.

Pat. 1,872,286. Process of and Reagent for Treating Petroleum Emulsions. Patented Aug. 16, 1932.

Pat. 1,872,333. Emulsion Breaking. Patented Aug. 16, 1932.

Pat. 1,873,165. Method of and Reagent for Treating Wet Oils. Patented Aug. 23, 1932.

Pat. 1,882,444. Process and Reagent for Treating Emulsions. Patented Oct. 11, 1932.

Pat. 1,890,789. Process and Product for Treating Emulsions of Mineral Oils or the Like. Patented Dec. 13, 1932.

Pat. 1,890,849. Use of Pine Oil in Emulsion Breakers. Patented Dec. 13, 1932.

Pat. 1,897,019. Treatment of Cut Oils. Patented Feb. 7, 1933.

Pat. 1,897,021. Medium for Dehydrating Cut Oils. Patented Feb. 7, 1933.

Pat. 1,897,574. Process for Breaking Petroleum Emulsions. Patented Feb. 14, 1933.

Pat. 1,897,575. Process for Breaking Petroleum Emulsions. Patented Feb. 14, 1933.

Pat. 1,902,129. Means for Breaking Water in Oil Emulsions. Patented Mar. 21, 1933.

Pat. 1,908,129. Process for Breaking Petroleum Emulsions. Patented May 9, 1933.

Pat. 1,908,130. Process for Breaking Petroleum Emulsions. Patented May 9, 1933.

Pat. 1,910,680. Process for Breaking Petroleum Emulsions. Patented May 23, 1933.

Pat. 1,913,538. Process for Breaking Petroleum Emulsions. Patented June 13, 1933.

Pat. 1,926,715. Process for Breaking Petroleum Emulsions. Patented Sept. 12, 1933.

Pat. 1,929,399. Medium for Separating Oil-Water Emulsions (Blown Oil). Patented Oct. 3, 1933.

Pat. 1,938,322. Process for Breaking Petroleum Emulsions. Patented Dec. 5, 1933.

Pat. 1,938,323 Process for Breaking Petroleum Emulsions. Patented Dec. 5, 1933.

Pat. 1,940,390. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,391. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,392. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,393. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,394. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,395. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,396. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,397. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,940,398. Process for Breaking Petroleum Emulsions. Patented Dec. 19, 1933.

Pat. 1,941,886. Emulsion Decomposing Body. Patented Jan. 2, 1934.

Pat. 1,943,815. Process for Breaking Petroleum Emulsions. Patented Jan. 16, 1934.

Pat. 1,944,021. Treatment of Wet Oil. Patented Jan. 16, 1934.

Pat. 1,954,585. Process for Breaking Petroleum Emulsions. Patented Apr. 10, 1934.

Pat. 1,961,963. Process for Breaking Petroleum Emulsions. Patented June 5, 1934.

Pat. 1,975,839. Process for Breaking Petroleum Emulsions. Patented Oct. 9, 1934.

Pat. 1,976,602. Process for Breaking Petroleum Emulsions. Patented Oct. 9, 1934.

Pat. 1,977,048. Process for Breaking Petroleum Emulsions. Patented Oct. 16, 1934.

Pat. 1,977,089. Process for Breaking Petroleum Emulsions. Patented Oct. 16, 1934.

Pat. 1,977,146. Process for Breaking Petroleum Emulsions. Patented Oct. 16, 1934.

Pat. 1,978,227. Process for Breaking Petroleum Emulsions. Patented Oct. 23, 1934.

Pat. 1,979,347. Process for Breaking Petroleum Emulsions. Patented Nov. 6, 1934.

Pat. 1,984,633. Process for Breaking Petroleum Emulsions. Patented Dec. 18, 1934.

Pat. 1,985,692. Process for Breaking Petroleum Emulsions. Patented Dec. 25, 1934.

Pat. 1,985,720. Process for Breaking Petroleum Emulsions. Patented Dec. 25, 1934.

Pat. 1,988,832. Process for Breaking Petroleum Emulsions. Patented Jan. 22, 1935.

Pat. 1,988,833. Process for Breaking Petroleum Emulsions. Patented Jan. 22, 1935.

Pat. 1,988,834. Process for Breaking Petroleum Emulsions. Patented Jan. 22, 1935.

Pat. 1,988,835. Process for Breaking Petroleum Emulsions. Patented Jan. 22, 1935.

Pat. 1,994,758. Process for Breaking Petroleum Emulsions. Patented Mar. 19, 1935.

Pat. 2,000,717. Process for Breaking Petroleum Emulsions. Patented May 7, 1935.

Pat. 2,000,725. Breaking of Oil-Water Emulsions. Patented May 7, 1935.

Pat. 2,000,802. Breaking of Oil-Water Emulsions. Patented May 7, 1935.

Pat. 2,015,260. Process for Breaking Petroleum Emulsions. Patented Sept. 24, 1935.

Pat. 2,023,976. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.

Pat. 2,023,979. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.

Pat. 2,023,980. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.

Pat. 2,023,981. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.

Pat. 2,023,982. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.

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Pat. 2,023,993. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.
Pat. 2,023,994. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.
Pat. 2,023,995. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.
Pat. 2,023,996. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.
Pat. 2,023,997. Process for Breaking Petroleum Emulsions. Patented Dec. 10, 1935.
Pat. 2,025,804. Process for Breaking Petroleum Emulsions. Patented Dec. 31, 1935.
Pat. 2,025,805. Process for Breaking Petroleum Emulsions. Patented Dec. 31, 1935.
Pat. 2,026,195. Process for Breaking Petroleum Emulsions. Patented Dec. 31, 1935.
Pat. 2,026,217. Process for Breaking Petroleum Emulsions. Patented Dec. 31, 1935.
Pat. 2,026,218. Process for Breaking Petroleum Emulsions. Patented Dec. 31, 1935.
Pat. 2,026,219. Process for Breaking Petroleum Emulsions. Patented Dec. 31, 1935.
Pat. 2,034,941. Process for Breaking Petroleum Emulsions. Patented Mar. 24, 1936.
Pat. 2,034,963. Process for Breaking Petroleum Emulsions. Patented Mar. 24, 1936.
Pat. 2,037,885. Process for Breaking Petroleum Emulsions. Patented Apr. 21, 1936.
Pat. 2,037,886. Process for Breaking Petroleum Emulsions. Patented Apr. 21, 1936.
Pat. 2,050,923. Process for Breaking Petroleum Emulsions. Patented Aug. 11, 1936.
Pat. 2,050,924. Process for Breaking Petroleum Emulsions. Patented Aug. 11, 1936.
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Pat. 2,050,928. Process for Breaking Petroleum Emulsions. Patented Aug. 11, 1936.
Pat. 2,050,929. Process for Breaking Petroleum Emulsions. Patented Aug. 11, 1936.
Pat. 2,050,930. Process for Breaking Petroleum Emulsions. Patented Aug. 11, 1936.
Pat. 2,052,281. Processes for Breaking Petroleum Emulsions. Patented Aug. 25, 1936.
Pat. 2,052,282. Processes for Breaking Petroleum Emulsions. Patented Aug. 25, 1936.
Pat. 2,052,283. Processes for Breaking Petroleum Emulsions. Patented Aug. 25, 1936.
Pat. 2,052,284. Processes for Breaking Petroleum Emulsions. Patented Aug. 25, 1936.
Pat. 2,058,568. Process of Breaking Petroleum Emulsions. Patented Oct. 27, 1936.
Pat. 2,058,569. Process for Separating Petroleum Emulsions. Patented Oct. 27, 1936.
Pat. 2,058,570. Process for Separating Petroleum Emulsions. Patented Oct. 27, 1936.
Pat. 2,072,085. Process for Breaking Emulsions. Patented Mar. 2, 1937.
Pat. 2,076,623. Process for Breaking Petroleum Emulsions. Patented Apr. 13, 1937.
Pat. 2,076,624. Process for Breaking Petroleum Emulsions. Patented Apr. 13, 1937.
Pat. 2,077,229. Processes for Breaking Petroleum Emulsions. Patented Apr. 13, 1937.
Pat. 2,077,230. Process for Breaking Petroleum Emulsions. Patented Apr. 13, 1937.
Pat. 2,077,745. Process for Breaking Petroleum Emulsions. Patented Apr. 20, 1937.
Pat. 2,077,746. Process for Breaking Petroleum Emulsions. Patented Apr. 20, 1937.
Pat. 2,078,652. Process for Breaking Petroleum Emulsions. Patented Apr. 27, 1937.
Pat. 2,078,653. Process for Breaking Petroleum Emulsions. Patented Apr. 27, 1937.
Pat. 2,078,654. Process for Breaking Petroleum Emulsions. Patented Apr. 27, 1937.
Pat. 2,078,655. Process for Breaking Petroleum Emulsions. Patented Apr. 27, 1937.
Pat. 2,079,762. Processes for Breaking Petroleum Emulsions. Patented May 11, 1937.
Pat. 2,079,763. Processes for Breaking Petroleum Emulsions. Patented May 11, 1937.
Pat. 2,079,764. Process for Breaking Petroleum Emulsions. Patented May 11, 1937.
Pat. 2,081,003. Process for Breaking Petroleum Emulsions. Patented May 18, 1937.
Pat. 2,081,004. Process for Breaking Petroleum Emulsions. Patented May 18, 1937.
Pat. 2,081,005. Process for Breaking Petroleum Emulsions. Patented May 18, 1937.
Pat. 2,083,220. Process for Breaking Petroleum. Patented June 8, 1937.
Pat. 2,083,221. Process for Breaking Petroleum Emulsions. Patented June 8, 1937.
Pat. 2,083,222. Process for Breaking Petroleum Emulsions. Patented June 8, 1937.
Pat. 2,083,223. Process for Breaking Petroleum Emulsions. Patented June 8, 1937.
Pat. 2,084,224. Process for Breaking Petroleum Emulsions. Patented June 8, 1937.
Pat. 2,083,225. Process for Breaking Petroleum Emulsions. Patented June 8, 1937.
Pat. 2,085,298. Processes for Breaking Petroleum Emulsions. Patented June 29, 1937.
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Pat. 2,086,215. Processes for Breaking Petroleum Emulsions. Patented July 6, 1937.
Pat. 2,086,216. Process for Breaking Petroleum Emulsions. Patented July 6, 1937.
Pat. 2,086,217. Process for Breaking Petroleum Emulsions. Patented July 6, 1937.
Pat. 2,089,035. Process for Treating Cognate Liquids of a Well. Patented Aug. 3, 1937.
Pat. 2,104,793. Process for Breaking Petroleum Emulsions. Patented Jan. 11, 1938.
Pat. 2,104,794. Process for Breaking Petroleum Emulsions. Patented Jan. 11, 1938.
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Pat. 2,106,239. Process for Breaking Petroleum Emulsions. Patented Jan. 25, 1938.
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Pat. 2,106,243. Process for Breaking Petroleum Emulsions. Patented Jan. 25, 1938.
Pat. 2,106,244. Process for Breaking Petroleum Emulsions. Patented Jan. 25, 1938.
Pat. 2,108,960. Process for Breaking Petroleum Emulsions. Patented Feb. 22, 1938.
Pat. 2,108,961. Process for Breaking Petroleum Emulsions. Patented Feb. 22, 1938.
Pat. 2,110,837. Process for Breaking Petroleum Emulsions. Patented Mar. 8, 1938.
Pat. 2,110,846. Process for Breaking Petroleum Emulsions. Patented Mar. 8, 1938.
Pat. 2,110,847. Process for Breaking Petroleum Emulsions. Patented Mar. 8, 1938.
Pat. 2,110,848. Process for Breaking Petroleum Emulsions. Patented Mar. 8, 1938.
Pat. 2,110,849. Process for Breaking Petroleum Emulsions. Patented Mar. 8, 1938.
Pat. 2,114,651. Process for Separating Petroleum Emulsions. Patented Apr. 19, 1938.
Pat. 2,122,976. Process for Separating Petroleum Emulsions. Patented July 5, 1938.
Pat. 2,126,368. Process for Breaking Emulsions. Patented Aug. 9, 1938.
Pat. 2,127,905. Process for Breaking Petroleum Emulsions. Patented Aug. 23, 1938.
Pat. 2,153,744. Process for Resolving Petroleum Emulsions. Patented Apr. 11, 1939.
Pat. 2,153,745. Process for Resolving Petroleum Emulsions. Patented Apr. 11, 1939.
Pat. 2,153,746. Process for Resolving Petroleum Emulsions. Patented Apr. 11, 1939.
Pat. 2,154,422. Composition of Matter and Process for Resolving Petroleum Emulsions. Patented Apr. 18, 1939.
Pat. 2,154,423. Composition of Matter and Process for Resolving Petroleum Emulsions. Patented Apr. 18, 1939.
Pat. 2,166,431. Process for Resolving Petroleum Emulsions. Patented July 18, 1939.
Pat. 2,166,432. Process for Resolving Petroleum Emulsions. Patented July 18, 1939.
Pat. 2,166,433. Process for Resolving Petroleum Emulsions. Patented July 18, 1939.
Pat. 2,166,434. Process for Resolving Petroleum Emulsions. Patented July 18, 1939.
Pat. 2,167,346. Process for Breaking Petroleum Emulsions. Patented July 25, 1939.
Pat. 2,167,347. Process for Breaking Petroleum Emulsions. Patented July 25, 1939.
Pat. 2,167,348. Process for Breaking Petroleum Emulsions. Patented July 25, 1939.
Pat. 2,167,349. Process for Breaking Petroleum Emulsions. Patented July 25, 1939.
Pat. 2,171,328. Process for Resolving Petroleum Emulsions. Patented Aug. 29, 1939.
Pat. 2,176,702. Process for Resolving Petroleum Emulsions. Patented Oct. 17, 1939.
Pat. 2,176,703. Process for Resolving Petroleum Emulsions. Patented Oct. 17, 1939.
Pat. 2,176,704. Process for Resolving Petroleum Emulsions. Patented Oct. 17, 1939.
Pat. 2,183,487. Process of Breaking Emulsions. Patented Dec. 12, 1939.
Pat. 2,192,993. Process for Resolving Petroleum Emulsions. Patented Mar. 12, 1940.
Pat. 2,192,994. Process for Resolving Petroleum Emulsions. Patented Mar. 12, 1940.
Pat. 2,192,995. Process for Resolving Petroleum Emulsions. Patented Mar. 12, 1940.
Pat. 2,225,824. Process for Resolving Petroleum Emulsions. Patented Dec. 24, 1940.
Pat. 2,226,118. Process for Resolving Petroleum Emulsions. Patented Dec. 24, 1940.
Pat. 2,226,120. Process for Resolving Petroleum Emulsions. Patented Dec. 24, 1940.
Pat. 2,226,121. Process for Resolving Petroleum Emulsions. Patented Dec. 24, 1940.
Pat. 2,226,122. Process for Resolving Petroleum Emulsions. Patented Dec. 24, 1940.
Pat. 2,226,123. Process for Resolving Petroleum Emulsions. Patented Dec. 24, 1940.
Pat. 2,231,752. Process for Resolving Petroleum Emulsions. Patented Feb. 11, 1941.
Pat. 2,231,753. Process for Resolving Petroleum Emulsions. Patented Feb. 11, 1941.
Pat. 2,231,754. Process for Resolving Petroleum Emulsions. Patented Feb. 11, 1941.
Pat. 2,231,755. Process for Resolving Petroleum Emulsions. Patented Feb. 11, 1941.
Pat. 2,231,756. Process for Resolving Petroleum Emulsions. Patented Feb. 11, 1941.

(*To be continued next month*)

(Continued from page 765)

Asbestos yarn comprising blend consisting of asbestos and cellulosic fibers, at least one tenth of cellulosic fibers being crimped viscose rayon staple fibers. No. 2,401,389. Joseph Truitt to American Viscose Corp.

Manufacture of hard and dense fibrocementitious sheets having embossed and finely textured veneer surface, comprising forming friable, agglomerate pellets containing finely-divided mineral pigment and hydraulic cement, distributing friable pellets as surfacing layer over moist compressible asbestos-cement base sheet, and crushing pellets. No. 2,401,663. Ernest Rembert to Johns-Manville Corp.

Laminated fibrous sheet material for making paper drums which is resistant to moisture and bacterial growth which comprises superimposed fibrous sheets adhesively secured together with composition consisting of aqueous ammoniacal dispersion of casein and compound selected from ammonium and water-soluble primary aliphatic amine complex compounds of salts of metals from zinc, cadmium, and magnesium. No. 2,401,675. Harris Ware to Hercules Powder Co.

*Textiles

Textile material for industrial use comprising resin-impregnated stiffened woven fabric having no tendency to curl, composed of sets of twisted cellulosic yarns and resinous impregnation. No. 2,400,379. Ross Whitman to The Kendall Co.

Mildewproofing textile material which comprises treating textile with phenanthraquinone-9,10. No. 2,401,028. William ter Horst to United States Rubber Co.

Reducing tendency of wool to felt which comprises treating wool at below 60° C. with reagent consisting of inorganic caustic alkali dissolved in monohydric alcohol. No. 2,401,479. Archibald Hall and Frederick Wood to Tootal Broadhurst Lee Co. Ltd.

*Water, Sewage and Sanitation

Treating water which includes adding to water, compound chosen from aliphatic primary and secondary amines. No. 2,400,543. Wayne Denman to Dearborn Chemical Co.

Control of slime formation in circulating water systems comprising introducing into water from 5 to 20 parts per million of combination of (A) 1.0 part by weight of water-soluble copper salt and (B) from 1 to 18 parts by weight of a water-soluble trichlorophenolate. No. 2,400,677. William Allen to The Dow Chemical Co.

Agricultural

Producing modified zein which comprises reacting zein in solution of volatile solvent containing as component, an aldehyde to form solution of zein capable of depositing body which when air-dried and baked is non-blushing with water. No. 2,402,128. Cyril Evans to A. E. Staley Mfg. Co.

Ergot spore suspension for storing culture of ergot until used to inoculate plants with disease of ergot consisting of ergot spores, ergot mycelium, commercially pure refined sugar and water. No. 2,402,902. Ralph Lewis to Michigan State Board of Agriculture.

Biochemical

Treating starch to render it free of thermophylic bacteria which comprises roasting starch having initial moisture content not exceeding 3%, at 240° to 260° F. No. 2,401,813. August Bulfer to Corn Products Refining Co.

Preparing yeast having high survival rate after re-hydration which comprises, propagating yeast cells from sulphite liquor with sufficient aeration to inhibit formation of alcohol, adverse conditions of propagation serving to toughen walls of yeast cells and coat them with lignin, later re-hydrating yeast and removing lignin at time of use. No. 2,401,819. Eric Eweson.

Cellulose

Comprising lanolin volatile organic solvent, and ethyl cellulose which is soluble in organic solvent and which has ethoxy content of from 43.5% to 49.5%. No. 2,402,551. Harold Holt to E. I. du Pont de Nemours & Co.

Molding from moist ligneous cellulose substance having moisture content of about 9%, a hard dense product. No. 2,402,554. Fergus Irvine and Emile Frederick, Jr., to The Celotex Corp.

Wrapping material comprising film of regenerated cellulose having lacquer film thereon composed of nitrocellulose, polyvinyl butyral resin and plasticizer, and wax coating superposed on lacquer film. No. 2,402,605. Tracy Cowen to Standard Cap and Seal Corp.

Hard porous composition produced by fusing mixture of caustic alkali and cellulose-containing material and member of group of silica and water-soluble silicates. No. 2,403,071. Clyde Gardenier to Thomas A. Edison, Inc.

Ceramics

Regenerating subdivided, combustible, solid, refractory catalyst material which has been contaminated with carbonaceous matter. No. 2,401,739. Everett Johnson to Standard Oil Co.

Ceramic composition which comprises titanates and stannates of alkaline earth metals. No. 2,402,515. Eugene Wainer to The Titanium Alloy Mfg. Co.

Dielectric composition consisting of barium titanate and alkaline earth zirconate, whereby dielectric properties of barium titanate are regulated. No. 2,402,516. Eugene Wainer to The Titanium Alloy Mfg. Co.

Dielectric composition consisting of alkaline earth titanate and alkaline earth zirconate ceramically combined for regulating dielectric properties of titanate. No. 2,402,517. Eugene Wainer to The Titanium Alloy Mfg. Co.

Ceramic composition which comprises calcium titanate and alkaline earth stannate. No. 2,402,518. Eugene Wainer to The Titanium Alloy Mfg. Co.

Manufacturing foundation for electrode structure comprising forming discrete separated adhesive areas on glass foundation, distributing fine particles of silicon carbide over said adhesive areas and heating to form bubbles in foundation underlying adhesive areas. No. 2,403,225. Harold Law to Radio Corp. of America.

Coatings

Resinous aqueous dispersion adapted to produce water-resistant film of coalesced resinous particles upon application to moist wood, said dispersion consisting of polymethacrylic ester of class methyl, ethyl, proyl, isopropyl, n-butyl and isobutyl polymethacrylates, vegetable oil, paraffin, dispersing agent and thickening agent. No. 2,402,331. Hamline Kvalnes to E. I. du Pont de Nemours & Co.

Lacquer comprising solution containing ethyl cellulose having ethoxy content of 43.5% to 46.5% and transformer oil, petroleum jelly and castor oil. No. 2,402,437. Herbet Northway to British Insulated Cables, Ltd.

Applying coating of cathode ray responsive material upon foundation surface which consists in suspending material in finely divided state in solution of nitrocellulose in amyl acetate, adding benzene to coating thereby toughening coating. No. 2,402,900. Lewis Koller to General Electric Co.

Applying an aluminum higher fatty acid soap-wax jell to sheet material to provide non-penetrating laminant. No. 2,402,903. Peter Massey and Lothian Burgess to H. P. Smith Paper Co.

Lacquer composition comprising cellulose plastic, thinning solvent, and water-insoluble metal salt of perthiocyanic acid as pigment ingredient. No. 2,402,961. William Hill to Koppers Co., Inc.

As a lacquer, composition comprising cellulosic plastic lac and as pigment ingredient perthiocyanic acid. No. 2,402,962. William Hill to Koppers Co., Inc.

Apparatus for reducing solid waxy or other coating material to comminuted form suitable for coating articles. No. 2,402,986. Thomas Cunning to Brogdex Co.

Providing metal surfaces with protective layer of polyvinyl compound which comprises applying to metal surface a liquid composition consisting of (a) polymer of monovinyl compound, (b) thermo-setting resin ingredients comprising polydric phenol, aldehyde and polymerization catalyst, and (c) organic solvent for constituents (a) and (b) causing ingredients to react to form insoluble, infusible resin, and finally associating layer comprising polymer of monovinyl compound with said base coat. No. 2,403,077. Albert Hershberger to E. I. du Pont de Nemours & Co.

Producing article with painted surface carrying colored markings, comprising applying primer coating material to article, applying organic dye to dry primer coat in configuration desired, applying finish coating including film forming resins and solvent. No. 2,403,084. Paul James to Westinghouse Electric Corp.

Anticorrosion coating composition for metals comprising mineral oil and fatty oil with anticorrosive agent a fatty amido-amine. No. 2,403,293. John Miskel to National Oil Products Co.

Making useful varnish bodies which comprises heating together castor oil and rosin and subsequently esterifying with polyhydric alcohol. No. 2,403,300. Alfred Rheineck and Samuel Crecelius to Devoe & Reynolds Co., Inc.

Finishing ferrous metal surfaces, which included treating surface with composition which consists of aqueous solution primary and secondary phosphates from alkali metals and ammonium, rinsing surface so treated with dilute aqueous solution containing chromic acid, drying rinsed surface and applying siccative finished coat. No. 2,403,426. Alfred Douty and Gerald Romig to American Chemical Paint Co.

Dyestuffs

Tetrakisazodyestuffs. No. 2,401,868. Joseph Gyr, Raymond Gunst to Society of Chemical Industry.

Improving fastness to combustion products of coal gas of dyeings on textile materials, and the like, having basis of organic derivative of cellulose dyed with water insoluble dyes selected from 1-amino-4-oxy-anthraquinone dyes and 1:4-diamino-anthraquinone dyes, which comprise impregnating textile materials with water-insoluble resinous condensation product of aldehyde with aminotriazine. No. 2,403,019. Henry Olpin and Sydney Gibson to British Celanese Ltd.

Equipment

Froth flotation apparatus comprising tank for pulp having feed inlet and discharge outlet determining liquid level therein, etc. No. 2,401,745. James Brown to B. & B. Flotation Co.

Electrolytic cell for production of light metals from fused salt baths heavier than the metal. No. 2,401,821. William Gardiner to Mathieson Alkali Works, Inc.

Open-hearth furnace. No. 2,402,152. Edward Drzewiecki.

Fluid separator in a steam generator. No. 2,402,154. James Fletcher to Babcock & Wilcox Co.

Colloid mill. No. 2,402,170. Albert Lund.

Apparatus for manufacture of particle coated webs. No. 2,402,183. Robert Rowe and Jane Goefert to Carborundum Co.

Sectional tank of knockdown type for storage of volatile fluids, including plurality of nestable sections. No. 2,402,253. Donald Macleod to United Steel Fabricators, Inc.

Recuperative heat exchanger for two gaseous media having different temperatures. No. 2,402,307. Torbjörn Vannerus.

Gas supply apparatus comprising, plurality of acetylene gas generator units; single gas delivery conduit communicating with all of units; and control system for maintaining adequate flow of gas from units through conduit to gas consuming means having variable gas requirements. No. 2,402,522. James Bucknam to Union Carbide and Carbon Corp.

Gas supply apparatus and control system therefor. No. 2,402,523. Chester Siver to Union Carbide & Carbon Corp.

Chemical feed pump mechanism. No. 2,402,524. Jeff Corydon to Morse Boulger Destructor Co.

Dissolving apparatus comprising tank container for solid material positioned within, said container having walls composed of upwardly and outwardly sloping louver boards arranged in vertically spaced overlapping relation to retain solid, etc. No. 2,402,636. Dale Kaufmann to International Salt Co., Inc.

System for setting solids from fluid suspensions, comprising tank, series of superposed settling compartments therein, distributor divided into mixing chambers in corresponding relation to settling compartments. No. 2,402,649. Leland Logue to Mining Process and Patent Co.

* Continued from Vol. 586, Nos. 2, 3, 4, Vol. 587, No. 1.

Apparatus for distilling liquids by solar radiation comprising absorbent layer of material moveable in position normal to sun's rays, etc. No. 2,402,737. William Delano to Gallowhur Chemical Corp.

Apparatus for continuous filtration comprising endless filter medium; means for supporting filter medium and moving filter medium along rotary path having upper and lower limits; means for maintaining body of fluent matter contacting filter medium on ascending side of said path, etc. No. 2,403,021. Clarence L. Peterson and Clarence J. Peterson.

Centrifugal separator. No. 2,403,089. Ernest Lars.

Apparatus for cooling liquid. No. 2,403,272. Clyde Freer to the Halsey W. Taylor Co.

Explosives

Explosive charge of primary detonating type comprising primary detonating compound blended with water-insoluble metal soap in finely-divided form. No. 2,402,235. Lawton Burrows and Walter Lawson to E. I. du Pont de Nemours & Co.

Food

Producing improved margarine which comprises incorporating therein an aqueous imbibition comprising phosphatide. No. 2,402,690. Joseph Stanley to American Lecithin Co.

Improved nut butter comprising homogeneous mass of comminuted nuts, and emulsion containing cholesteryl-betaine-chloride. No. 2,402,915. Joseph Rosefield and Fitzhugh Avera.

Producing purified sugar juice, which comprises mixing raw juice in rapidly circulating body of previously formed precipitate with hydrogen zeolite, etc. No. 2,402,960. Hilding Gustafson and Lewis Paley to Infilco Inc.

Solid dehydrated expanded cellular caramel, cells of which are formed and caused to break into communication with one another by heating liquid caramel and expanding under high vacuum. No. 2,402,999. Wilbert Heyman to Granular Foods, Inc.

In feed product composition comprising calcium carbonate carrying adsorbed oxygen and oxidation-reduction potential reducing reagent selected from sulfur dioxide, sodium sulfide, calcium sulfide, potassium sulfide and elemental sulfur, and vitamin concentrate. No. 2,403,010. Brack McHan to Calcium Carbonate Co.

Treating fish water by evaporation to increase concentration thereof and maintain solubility of constituents comprising: adding acidic phosphitic compound to maintain pH in acid range during evaporation. No. 2,403,174. Robert Ernst to General American Transportation Corp.

Purifying raw sugar juices comprising passing entering raw juice and acid effluent from hydrogen exchange bed into mixing and reaction zone, etc. No. 2,403,177. Hilding Gustafson to Infilco Inc.

Inorganic

Manufacture of catalyst which comprises mixing aluminum halide and phosphoric acid selected from ortho, meta and pyro phosphoric acids and heating to evolve hydrogen halide. No. 2,402,051. Vladimir Ipatieff and Louis Schmerling to Universal Oil Products Co.

Producing hexavalent chromium which comprises maintaining ferrochromium in finely divided form in contact with oxygen-containing gas at above 1250° C. carbon present is eliminated and chromium is converted to trivalent condition, maintaining trivalent chromium in contact with oxygen-containing gas at below 1000° C. in presence of compound from lime and basic alkali-metal compounds until it is converted to hexavalent condition. No. 2,402,102. Marvin J. Udy.

Production of ammonium nitrate in granular form which comprises spraying, an aqueous ammonium nitrate solution having saturation temperature within 115° C. to 135° C., into gaseous cooling medium maintained at lower temperature, whereby outer surface of each individual droplet is suddenly chilled and crystallizes in form of shell, etc. No. 2,402,192. Lloyd Wright and Robert Hendricks to The Consolidated Mining and Smelting Co. of Canada, Ltd.

Converting magnesium silicate to magnesium sulphate which comprises supporting mass of granular magnesium silicate in contact with body of sulphuric acid to take up sulphuric acid by capillary action. No. 2,402,370. Henry Chalmers.

Calcining potash alum to produce pure alumina, comprising heating potash alum to decompose aluminum sulfate component, and controlling atmosphere above charge to inhibit decomposition of potassium sulfate component by returning to furnace a portion of exit gases. No. 2,402,471. Sidney Tuwiner and William Osborn to Phelps Dodge Corp.

Apparatus for producing SO_3 from molten sulphur. No. 2,402,553. David Hurt, George Stafford and Ernest Tauch to E. I. du Pont de Nemours & Co.

Producing ingot of silicon of high rectifying power having zones of different electrical characteristics separated by internal barrier surface. No. 2,402,582. Jack Scaff to Bell Telephone Laboratories.

Metal sulfide hydrogenation catalyst prepared by treating alloy of alkali soluble metal and metal selected from hydrogenating metals of 1st, 6th and 8th groups of periodic table with alkali metal sulfide. No. 2,402,626. Benjamin Howk to E. I. du Pont de Nemours & Co.

Photo-E. M. F. cell comprising slab of solidified fused silicon having light sensitive barrier produced by fusing and cooling granulated silicon of a purity in excess of 99% and thin coating of transparent lacquer on polished surface. No. 2,402,662. Russell Ohl to Bell Telephone Laboratories, Inc.

Thermoelectric device comprising section of used silicon ingot having transverse barrier zone produced by fusing and cooling granulated silicon having purity in excess of 99 percent. No. 2,402,663. Russell Ohl to Bell Telephone Laboratories, Inc.

Producing pure aluminum sulphate from crude solution of aluminum sulphate which comprises adding sulfuric acid, etc., and then adding to said solution an aqueous solution of ethyl alcohol to yield fluid mass during crystallization and for ease of recovery of alcohol. No. 2,402,668. Paul Roller.

Metal sulfide hydrogenation catalyst active at low temperatures and in presence of sulfur containing compounds, said catalyst being identical with product obtained by bringing hydrogenating metal in finely divided activated form into contact with sulfiding agent. No. 2,402,683. Frank Signaigo to E. I. du Pont de Nemours & Co.

Metal sulfide hydrogenation catalyst active at low temperatures and in presence of sulfur compounds, catalyst being obtained by bringing together in solution a salt of metal of iron group of periodic table with inorganic polysulfide thereby precipitating metal polysulfide, and treating precipitated metal polysulfide with hydrogen. No. 2,402,684. Frank Signaigo to E. I. du Pont de Nemours & Co.

Preparation of catalyst for production of styrene comprising impregnating carbon with salt of metal selected from eighth group of periodic table, heating impregnated carbon to dry it and convert metal salt to corresponding metal oxide, and reducing oxide to free metal. No. 2,402,740. Thomas Doumani, Roland Deery to Union Oil Co.

Phosphor consisting of zinc compounded with element of group of sulphur and selenium, said compound being spectroscopically pure and activated by plurality of metals from silver, copper and gold. No. 2,402,757. Humboldt Leverenz to Radio Corp. of America.

Preparing luminescent phosphor of metal compounded with element selected from sulphur and selenium which includes firing constituents of phosphor in presence of three fluxes, one of which is selected from each of three groups of fluxes consisting of alkali metal halide, alkaline earth metal halide and hydrogen containing halide. No. 2,402,759. Humboldt Leverenz to Radio Corp. of America.

Crystallized luminescent material consisting of oxides of beryllium, zirconium, and silicon. No. 2,402,760. Humboldt Leverenz to Radio Corp. of America.

Luminescent material comprising fired mixture of tri-calcium phosphate, dibasic calcium phosphate and cerium phosphate. No. 2,402,855. William Toorks to Sylvania Electric Products Inc.

Luminescent material consisting of phosphor of zirconate of metal of group of strontium, barium, and cadmium, activated with bismuth. No. 2,402,955. Herman Froelich to General Electric Co.

Removing boron containing compound from brine which comprises contacting brine with dried and granular material taken from oxides, hydroxides, silicates, and phosphates of iron, chromium, nickel, magnesium and aluminum, then regenerating material by contacting it with dilute solution of caustic. No. 2,402,959. Hilding Gustafson and Edward Kominek, Jr. to Infilco Inc.

Making selenium element, which comprises compressing amorphous selenium powder to form selenium wafer, then converting wafer to the metallic form, then covering by wafer the surface of base plate, and fusing metallic wafer to plate. No. 2,403,026. Otto Saslaw to Federal Telephone & Radio Corp.

Concentration of nitric acid. No. 2,403,050. Francis Chambers, Jr. and Robert Gartside to E. I. du Pont de Nemours & Co.

Producing fluoboric acid which comprises heating ammonium fluoborate at 250° C. and heating vapor thus formed at 600° C. No. 2,403,148. Wayne White to Aluminum Co. of America.

Producing solid zincated alkalies in medium of caustic alkali, step of dissolving zinc oxide in fused hydrus caustic alkali. No. 2,430,157. Walter Wegst, Leslie Bacon and Ralph McNabney to Wyandotte Chemicals Corp.

Ozone generating cell. No. 2,403,241. Richard Schaefer to Sanozone Corp.

Iron hydrate and manufacture and use of same. No. 2,403,248. Seldon Todd and Fredric Verdium to The Sherwin-Williams Co.

Medicinal

Synthetic oestrogens. No. 2,402,054. Morris Kharasch to Eli Lilly and Co.

Metallurgy, Ores

Electron discharge device of electron multiplying type including cathode of metal alloyed with alkali metal and secondary electron emitter of metal alloyed with alkali metal. No. 2,401,734. Robert Janes to Radio Corporation of America.

Phototube comprising envelope having window, cathode member having alkali metal sensitized coating of metal selected from antimony, arsenic and bismuth, anode, and transparent alkali metal sensitized coating of said metal on said window, said coating being reddish. No. 2,401,736. Robert Janes to Radio Corp. of America.

Phototube comprising tubular glass envelope, metal closure forming end walls of envelope, coating of element which when sensitized with alkali metal is photosensitive facing and removed from one of said closures and source of alkali metal supported by one closure to sensitize coating. No. 2,401,737. Robert Janes to Radio Corp. of America.

Making deep drawing sheets of austenitic steels containing 1.25 to 1.35% carbon, 12.75 to 13.25% manganese, 0.30 to 0.45% silicon, 0.05% sulphur and 0.1% phosphorous. No. 2,401,818. John Eckel to Carnegie-Illinois Steel Corp.

Steel for high temperature service containing .15 to .30% carbon, .30 to 2.00% manganese, .10 to .30% phosphorous, .25 to 2.00% molybdenum, .15 to .50% silicon, and .05% sulphur, with balance all iron with less than .01% oxygen combined with iron. No. 2,401,851. Edwin Wright to National Tube Co.

Hot bonding metal sheet to material having low coefficient of thermal expansion which comprises pressing edges of metal sheet against hot platen of press there being layer of curable adhesive between fibrous material and metal sheet. No. 2,401,987. William Taylor and Robert Jones to Wingfoot Corp.

Annealing cold rolled low carbon steel for making tin plate. No. 2,402,013. Arno Billeter and Michael King to Carnegie-Illinois Steel Corp.

Making articles on which overlays are welded, said article containing 0.1% carbon, 11 to 15% chromium, and balance mainly iron. ascertaining expansion on cooling as after welding operation, and welding overlays on chromium steel. No. 2,402,031. Paul Hingham to Bethlehem Steel Co.

Producing molybdenum from reducible compound thereof, comprising moving compound through furnace from low temperature zone into one of higher temperature, passing reducing gas through furnace in direction opposite, and diluting reducing gas by introducing inert gas into furnace. No. 2,402,084. Robert Rennie to Westinghouse Electric Corp.

Recovering chromium from chromium-bearing material. No. 2,402,103. Marvin Udy.

Porous ferrous metal product comprising compacted and sintered mass composed of mixture of spongy, porous particles of pure iron resulting from reduction without melting of pulverized mill scale and solid irregularly shaped iron powder particles of small size resulting from complete decarburization of powder of class of steel and iron powders. No. 2,402,120. Alfred Boegehold and Robert Terry.

Alloy steel having high impact resistance for low temperatures in "as rolled" condition as well as after stress-relieving heat treatment, said steel containing carbon, manganese, phosphorus, silicon, copper, nickel, aluminum, molybdenum and iron. No. 2,402,135. James Hallay to Inland Steel Co.

Electrodeposition of tin comprising effecting deposition from aqueous acid solution of stannous compound which contains alkali thiocyanate and soluble compound selected from alkali ferricyanids and alkali ferrocyanides. No. 2,402,185. Ernest Schweikher to E. I. du Pont de Nemours & Co.

Producing magnesium by thermal reduction of oxidic magnesium ore at above melting point of magnesium, improvement consisting in use of reducing agent containing aluminum carbide. No. 2,402,193. Charles Willmore to Aluminum Co. of America.

Depositing film of one of the metals of group consisting of aluminum and magnesium with bright surface upon support of moisture absorbent material in sheet form. No. 2,402,269. Paul Alexander and Edwin Cranstone to Vapco Limited.

Removal of bismuth, arsenic and antimony from lead and lead alloys which comprises melting alloy, covering same with flux of alkali metal hydroxide, adding thereto reducing agent capable of forming alkali metal by reaction with said alkali metal hydroxide. No. 2,402,316. Joseph Dittmer to National Lead Co.

Recovering zinc from chloride solutions containing $MgCl_2$. No. 2,402,371. Niels Christsen to Combined Metals Reduction Co.

Hard tough corrosion and abrasion resistant ferrous phosphide alloy requiring no heat treatment to develop its desirable properties and having low phosphorous nickel and copper content, and including chromium, phosphorous, copper and nickel, remainder being iron. No. 2,402,424. Roy McCauley.

Apparatus for subdividing metals comprising elongated closed chamber, means including nozzle at one end of chamber for injecting solid stream of molten metal, including nozzle for impinging stream of gas against stream of metal, etc. No. 2,402,441. Leslie Paddle.

Apparatus for melting finely divided aluminum and alloys and other metals. No. 2,402,498. Norman Kohlhepp to Reynolds Metals Co.

Bath for electrodepositing ductile bright, nickel plate comprising aqueous acid nickel solution comprising material selected from nickel sulfate, nickel chloride, mixture of nickel sulfamate and nickel chloride, mixture of nickel sulfamate, nickel chloride and nickel sulfate, and mixture of nickel sulfate and nickel chloride, said solution having dissolved therein thallium sulfate aryl organic compound described in patent. No. 2,402,801. Henry Brown to The Udy-lite Corp.

Alloy steel possessing high creep resistance when applied for manufacture of parts to be operated under stress at up to 800° C., comprising: Carbon up to 1.5%, nickel 15.0 to 25.0%, chromium 12.0 to 20.0%, molybdenum 2.0 to 6.0%, copper 2.0 to 6.0%, titanium 0.25 to 2.0% and iron the remainder. No. 2,402,814. William Sheffield to Firth-Vickers Stainless Steels Limited.

Making ductile stainless and stainless clad rolled steel strips, which consists in electroplating layers of chromium and nickel upon low carbon rolled steel strip base and then subjecting plated base stock to two heat treating and cold rolling operations between heat treatments. No. 2,402,834. John Nachtman.

Well casting of steel containing phosphorus to enhance collapse resistance of casing and less than .02% oxygen combined with its iron. No. 2,402,862. Edwin Wright to National Tube Co.

Flux-forming fuel comprising comminuted composition containing, 4% to 36% iron, 28% to 63% manganese, 3% to 19% silicon, 4% to 50% aluminum, and 1% to 13% of substance selected from zirconium and calcium. No. 2,402,947. Charles Burch to The Linde Air Products Co.

Wrought heat-treated and artificially aged corrosion-resistant aluminum base alloy having high zinc content, composed of zinc 5-10%, magnesium 1-3.5%, copper 0.5-3%, nickel .05-.5%, and one of heavy metal-grain refining elements consisting of vanadium .03-.5% and chromium .10-.5%, balance aluminum. No. 2,403,037. Paul Zeigler and Leland Householder to Reynolds Metals Co.

Joining metal members by fused ceramic material bonded to their opposed adjacent surfaces. No. 2,403,079. Waldo Higgins to A. O. Smith Corp.

Brazing comprising immersion of articles to be joined into bath of molten brazing flux composed fluorides and chlorides of alkali metal and alkaline earth metals and in contact with receptacle composed of nickel or nickel alloy, improvement consisting in providing molten flux with nickel particles. No. 2,403,109. Mike Miller to Aluminum Co. of America.

Brazing medium consisting of particles of alkali metal chloride flux and intermixed particles of aluminum base alloy coated with film of said flux and pasting agent consisting of non-aqueous organic vehicle to form medium into paste. No. 2,403,110. Mike Miller to Aluminum Co. of America.

Heat resistant alloy comprising 20% to 60% nickel, 16% to 28% chromium, 4% to 20% molybdenum, less than 0.20% carbon, 3% manganese, and balance iron. No. 2,403,128. Howard Scott and Robert Gordon to Westinghouse Electric Corp.

Alloy steel composed of .05-2.00% of carbon, .5-14% of chromium, .5-6% of copper, .5-4.5% of silicon, and .05-.30% of beryllium, balance being iron. No. 2,403,141. Enrique Touceda and Ralph De Vries to Allegheny Ludlum Steel Corp.

Workable alloys having, 0.1 to 7.5% copper and 0.01 to 0.75% phosphorous, balance being zinc. No. 2,403,337. Edward Bunn to Revere Copper and Brass Incorp.

Separately recovering cuprous and ferrous constituents of scrap consisting of low carbon steel and associated copper or brass which comprises melting scrap, enriching molten ferrous constituent with carbon, silicon and manganese. No. 2,403,419. Richard Wilkins and Edward Bunn to Revere Copper and Brass Inc.

Organic

Preparing ether alcohol which consists in heating together excess of alkene oxide with alcohol from pentaerythritol and polypentaerythritols in presence of catalyst selected from carboxylic acids, their anhydrides, their chlorides, and partial and complete esters of carboxylic acids and polyhydric alcohols. No. 2,401,743. Philip Bowman, Robert Barth, Harry Burrell to Heyden Chemical Corp.

Production of pentaerythritol and polypentaerythritols by condensation of formaldehyde and acetaldehyde in presence of sodium hydroxide. No. 2,401,749. Raymond Burghardt, Robert Barth to Heyden Chemical Corp.

Manufacture of soap, which comprises reacting saponifiable material with aqueous solution of saponifying reagent in presence of inert organic diluent having solvent properties for saponifiable material. No. 2,401,756. James Gunther to Industrial Patents Corp.

Removing acetylene from hydrocarbon mixture comprising diolefin and acetylene steps of adding to mixture hydrocarbon diluent free from acetylenes to reduce content of diolefin and subsequently subjecting resulting mixture to dehydrogenation conditions in presence of catalyst comprising MgO and Fe_2O_3, K_2O and CuO. No. 2,401,758. Sam Hastings and Benjamin Turner to Standard Oil Development Co.

Snythetic drying oil comprising homogeneous composition which is composed of copolymer of a furylethylene and a fatty oil of group consisting and semi-drying oils. No. 2,401,769. Charles Mighton to E. I. du Pont de Nemours & Co.

Purifying fatty acid nitrile, step of heating nitrile in presence of maleic anyhydride. No. 2,401,772. Anderson Ralston, Lowell Crews and Edwin Colt to Armour & Company.

Alpha-substituted side-chain ketones of cyclopentanopolyhydrophenanthrene series and process of making same. No. 2,401.775. Tadeus Reichstein.

Production of 3-hydroxy-2-butanone which comprises fermentation of carbohydrate-containing mash by means of 2,3-butanediol-producing organism of genus Aerobacter and subsequent fermentation of resulting 2,3-butanediol-containing fermentation liquor by a 3-hydroxy-2-butanone-producing organism of genus Acetobacter. No. 2,401,778. Newell Sjolander and William Eiseman to Heyden Chemical Corp.

Converting mono-olefins to di-olefins which comprises contacting mono-olefins with solid granular catalyst comprising alumina having deposited on surfaces thereof oxide of metal of left-hand columns of groups IV, V and VI of periodic table. No. 2,401,802. Hugh Taylor and John Turkevich to The M. W. Kellogg Company.

Preparation of diolefins by catalytic dehydrogenation of olefins with steam resistant catalyst in presence of steam, step which comprises activating catalyst prior to dehydrogenation stage by passing mixture of steam and normally gaseous paraffin hydrocarbon in contact with catalyst. No. 2,401,846. Simpson Sumerford to Standard Oil Development Co.

Obtaining fluorohydrocarbon which comprises passing mixture of hydrogen fluoride and hydrocarbon selected from acetylene and monovinylacetylene over catalyst comprising mercuric chromite associated with chromite of metal which forms hydrogenating oxide. No. 2,401,850. Gerald Whitman to E. I. du Pont de Nemours & Co.

Converting ethane to butadiene. No. 2,401,872. Jean P. Jones to Phillips Petroleum Co.

Purifying benzene derivative having single benzene ring which is nitrated in benzene ring, which derivative has mixed therewith another derivative of different degree of nitration, which comprises subjecting product to action of aqueous solution of readily soluble salt of mononuclear acid of benzene series. No. 2,401,879. Ralph McKee.

Synthesis of paraffin hydrocarbons by catalytic alkylation of low boiling isoparaffins with aliphatic olefins having three carbon atoms per molecule which comprises pretreating catalyst consisting of inorganic normally liquid material selected from boron fluoride-phosphoric acid complex, boron fluoride hydrate, and mixtures of boron fluoride hydrate with hydrogen fluoride with non-alkylatable hydrocarbon containing olefin consisting of ethylene so that ethylene combines chemically with catalyst. No. 2,401,884. Walter Schulze, William Axe to Phillips Petroleum Co.

Separating alkyl alpha acetylenes from hydrocarbon mixtures containing alkyl alpha acetylenes. No. 2,401,896. Willard Asbury, Miller Swaney to Standard Oil Development Co.

Producing C_2F_4 from symmetrical $C_2F_4Cl_2$ which comprises enclosing symmetrical $C_2F_4Cl_2$ in container holding zinc having 90% activity as determined by ferric-alum method and methanol and heating mixture to 100° C. at 200 lbs. gauge pressure. No. 2,401,897. Anthony Benning, Frederick Downing, Roy Plunkett to Kinetic Chemicals, Inc.

Resolving a water-in-oil emulsion which comprises adding to it a substance obtained by reacting fatty material selected from fatty oils and fatty acids with polyalkylene glycol containing 8 carbon atoms, the fatty material being present in thickened form induced by oxidation or polymerization. No. 2,401,966. Richard A. Salathiel to Standard Oil Development Co.

Dehydrogenation of butylene and pentylene a feed stock comprising over dehydrogenation catalyst composed of magnesium oxide and iron oxide. No. 2,401,973. Wilson Seyfried and Sam Hastings to Standard Oil Development Co.

Sulphonium salts. No. 2,402,016. Edgar Britton and John Hansen to The Dow Chemical Co.

Condensation product of dicyandiamide and lower aliphatic ketone selected from acetone and methyl ethyl ketone. No. 2,402,061. Alexander MacLean to American Cyanamid Co.

Preparing 2-mercapto 4-alkyl 5-arylcarbamyl thiazoles which comprises reacting ammonium dithiocarbamate with arylamide of beta-ketonic acid having hydrogen and halogen atom attached to alpha carbon atom. No. 2,402,066. Roger Mathes to The B. F. Goodrich Co.

Purification of isopropyl alcohol obtained by treatment of propylene with sulfuric acid. No. 2,402,077. John Patterson to Standard Alcohol Co.

Producing alkylated aromatics which comprises subjecting alkylating agent, consisting of alkyl halide, and aromatic hydrocarbon to reaction under alkylating conditions and in presence of solid alkylating catalyst consisting of silica. No. 2,402,092. Louis Schmerling and Arthur Durinski to Universal Oil Products Co.

Stable mixture comprising diazonium salt preparation and as such a heterocyclic compound selected from sulfonic acid of quinaldines, pyridines, thiophens, furanes, cumarines, pyrazoles and the water-soluble salts of said sulfonic acids. No. 2,402,106. William von Glahn and William Walsh to General Aniline & Film Corp.

Monomeric butadiene stabilized with between 0.01% and 0.03% by weight of 4-tertiary-butyl catechol. No. 2,402,113. Lewis Hatch, David Adelson and Billee Blackburn to Shell Development Co.

Preparing methyl alpha-acetoxyproprionate and methyl lactate simultaneously, which comprises passing alpha-acetoxypropionic acid and methanol vapors counter-currently through a reactor. No. 2,402,129. Edward Filachione.

Reacting alpha-acetoxypropionic acid with compound selected from alkyl and aryl acetates, in presence of acid catalyst at 100° to 150° C., to form corresponding alkyl or aryl alpha-acetoxypropionate. No. 2,402,130. Edward Filachione and Charles Fisher.

Manufacture of acrolein which comprises reacting carbon monoxide and hydrogen with vinyl ester of carboxylic acid in presence of hydrogenating catalyst. No. 2,402,133. William Gresham and Richard Brooks to E. I. du Pont de Nemours & Co.

Preparation of nitrogen compounds which comprises heating amino-acetonitrile with aqueous ammonium carbonate under super-atmospheric pressure whereby solution containing ammonium hydantoate and hydantoin is obtained. No. 2,402,134. William Gresham and Carl Schweitzer to E. I du Pont de Nemours & Co.

Preparation of saturated aliphatic hydrocarbon radical substituted organic acid ester which comprises heating under ethylene pressure above 200 atmospheres an organic acid ester free of olefinic unsaturation and a peroxy catalyst. No. 2,402,137. William Hanford and John Roland to E. I. du Pont de Nemours & Co.

Separation of homologues of pyridine from a normally liquid mixture comprising 2,6-dimethylpyridine, 4-methylpyridine, and 3-methylpyridine, a fraction that is enriched in respect of one of said compounds, comprising cooling and normally liquid mixture to below 0° C. but above — 30° C. to — 50° C. and thereby forming therein solid phase. No. 2,402,158. William Glowacki and Charles Winans to Koppers Co.

Trinitrotoluene manufacture. No. 2,402,180. Charles Papazoni to Trojan Powder Co.

Preparation of oxazolines which comprises subjecting monoethanolamine to reaction with compound selected from alkyl, aryl, alkoxyalkane, and (Alkoxyalkoxy) alkane nitriles in presence of alkaline catalyst. No. 2,402,198. Donald Loder to E. I. du Pont de Nemours & Co.

Producing alpha-naptho-quinones by direct oxidation of condensed ring aromatic hydrocarbon selected from napthalene and beta-substituted naphthalenes which comprises subjecting hydrocarbon in presence of diluent therefor to oxidation by means of aqueous solution of hexavalent water-soluble chromium compound and mineral acid as oxidizing agent. No. 2,402,226. Julius Hyman and Carl Peters to Velsicol Corp.

Manufacture of styrene which comprises reacting benzene with acetylene in presence of composite of Friedel-Crafts metal halide catalyst and inert granular porous support. No. 2,402,243. Gustav Egloff to Universal Oil Products Co.

Production of isoprene from trimethylethylene which comprises subjecting feed stock comprising trimethylethylene to pyrolysis. No. 2,402,277. Frederick Frey to Phillips Petroleum Co.

Treating finely divided activated carbon comprising high density and low density activated particles that includes removing from carbon relatively light particles whose average specific gravity is lower than 0.266 and thereby obtaining higher density residual product having increased adsorptive activity. No. 2,402,304. Alan Stoneman.

Addition product of nitrogen tetroxide and dioxane. No. 2,402,315. John Crowder to The Solvay Process Co.

Catalytic reduction of aromatic nitro-compounds to corresponding amine, improvement which comprises subjecting commercial nitro aromatic containing poly-nitro compounds to first stage of reduction maintained under mild temperature conditions whereby poly-nitro compounds are reduced and thereafter subjecting mononitro derivatives to second reduction operation at higher temperature. No. 2,402,423. Ralph Mason to Sandard Oil Development Co.

Producing aromatic amines by reduction of aromatic nitro compounds which comprises passing liquid mixture of nitroaromatic and a non-reactive solvent through reducing zone containing catalyst comprising mixed sulfides of molybdenum, magnesium and zinc, supplying hydrogen in excess and water. No. 2,402,439. John J. Owen to Standard Oil Development Co.

Reducing aromatic nitro-1 compounds to corresponding aromatic amine which comprises passing vaporized aromatic nitro compound, with hydrogen, over catalyst consisting of copper sulfide supported on inert carrier. No. 2,402,440. John Owen to Standard Oil Development Co.

Improving water-sensitivity and oil-solubility of metal salt having formula M[—O—Ar(R)n]m in which M is metal, Ar is aromatic nucleus, R is alkyl group, which comprises blowing oil solution of salt with CO_2 in presence of H_2O, and filtering to remove undesirable precipitate. No. 2,402,448. Prescott Richards to Standard Oil Development Co.

Obtaining organic sulfides which comprises heating sulfur and normally gaseous mono-olefin in presence of inert liquid vehicle under pressure at 170° C. to 250° C. No. 2,402,456. Frank Signaigo to E. I. du Pont de Nemours & Co.

Producing mono-olefinic compound to exclusion of its corresponding saturated product of hydrogenation which comprises reacting unsaturated compound having four unsaturated carbon atoms in non-aromatic group with hydrogen under influence of catalyst having active surface predominating in nickel sulfide. No. 2,402,493. Bernard Greensfelder and Walter Peterson to Shell Development Co.

Capillary active salt. No. 2,402,495. Vernon Haury and Seaver Ballard to Shell Development Co.

1-alpha furyl adelhyde sulphonate-1. No. 2,402,510.. Jack Thurston to American Cyanamid Co.

Ethane substituted in 1-position with alpha-furyl group and sulphonate radical and in 2-position with ester group. No. 2,402,511. Jack Thurston to American Cyanamid Co.

Ethane having alpha-furyl group and sulphonate radical in 1-position and amide group attached thereto, in 1-position. No. 2,402,512. Jack Thurston to American Cyanamid Co.

Ethane having alpha-furyl group and sulphonate radical in 1-position and cyano group in 2-position. No. 2,402,513. Jack Thurston to American Cyanamid Co.

Ethane having alpha-furyl group and sulphonated radical in 1-position and nitro group in 2-position. No. 2,402,514. Jack Thurston to American Cyanamid Co.

Thiocyanate Quaternary compounds and method of preparing same. No. 2,402,526. Josef Piki to E. I. du Pont de Nemours & Co.

Preparing N-isobutylamides of castor oil acids which comprises heating castor oil in admixture with isobutylamine inclosed reaction vessel. No. 2,402,530. Euclid Bousquet to E. I. du Pont de Nemours & Co.

Production of sulphonic acid, which comprises subjecting to action of a sulphite an aryl amine having, attached to nitrogen atom thereof, an aliphatic hydrocarbon radical containing ethylenic linkage and thereby converting ethylenic linkage into saturated linkage and attaching sulphonic group. No. 2,402,538. Henry Dreyfus to Celanese Corp. of America.

Manufacture of N-isobutylamide of undecylenic acid. No. 2,402,541. Mark Farlor and Wilbur Lazier to E. I. du Pont de Nemours & Co.

Hydroxylation of unsaturated carboxylic acid compounds and the like. No. 2,402,566. Nicholas Milas to Research Corp.

Manufacture of the N-isobutylamide of undecylenic acid. No. 2,402,584. Norman Searle to E. I. du Pont de Nemours & Co.

Production of thiols which comprises heating in liquid phase an ethylenic compound containing as only unsaturation carbon-to-carbon multiple bonds, in contact with hydrogen sulfide, hydrogen, and metal sulfide catalyst. No. 2,402,586. Alfonso Alvardo to E. I. du Pone de Nemours & Co.

Bringing monoolefin hydrocarbon containing 6 carbon atoms into admix-

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ture with sulfur heating until reaction is complete, cooling, and oxidizing to sulphonic acid. No. 2,402,587. Alfonso Alvarado, Wilbur Lazier and James Werntz to E. I. du Pont de Nemours & Co.

New halovinylboron compounds. No. 2,402,589. Herrick Arnold to E. I. du Pont de Nemours & Co.

New organoboron compounds selected from chlorovinylboron acid and its anhydride, chlorovinylboron oxide. No. 2,402,590. Herrick Arnold to E. I. du Pont de Nemours & Co.

Ester of chlorovinylboronic acid. No. 2,402,591. Wilbur Lazier and Paul Salzberg to E. I. du Pont de Nemours & Co.

Cyclic diazo compounds. No. 2,402,611. Joseph Dickey and James McNally to Eastman Kodak Co.

Producing thiols which comprises reacting organic carbonyl compound with hydrogen and substance selected from elementary sulfur and hydrogen sulfide, in presence of sulfactive hydrogenation catalyst. No. 2,402,613. Mark Farlor and Frank Signaigo to E. I. du Pont de Nemours & Co.

Production of thiols which comprises reacting member of acyclic sulfides and alicyclic sulfides with hydrogen in presence of base metal sulfide hydrogenation catalyst. No. 2,402,614. Mark Farlow and Frank Signaigo to E. I. du Pont de Nemours & Co.

Ethylhexanedithiol-1.3. No. 2,402,615 Mark Farlow and Frank Signaigo to E. I. du Pone de Nemours & Co.

N-nitroaryl halorylsulphonamides. No. 2,402,623. William Hester to Rohm & Haas Co.

Lactone of 4-mercaptopimelic acid which comprises reacting in presence of sulfactive hydrogenation catalyst a carbonyl carboxylic acid substance selected from the acid, its anhydride, its esters and its amides with hydrogen and hydrogen sulfide. No. 2,402,639. Wilbur Lazier and Frank Signaigo to E. I. du Pont de Nemours & Co.

Preparation of hydroxyaliphatic thiols which comprises reacting organic hydroxycarbonyl compound with hydrogen and substance selected from elementary sulfur, hydrogen sulfide and compounds yielding hydrogen sulfide. No. 2,402,640. Wilbur Lazier and Frank Signaigo to E. I. du Pont de Nemours & Co.

Producing aryl thiol which comprises catalytically hydrogenating oxygenated sulfur group of compound of aryl sulfonic acids, sulfinic acids, the thio analogs of these acids and substances hydrolyzable to these. No. 2,402,641. Wilbur Lazier and Frank Signaigo to E. I. du Pont de Nemours & Co.

Production of thiols, which comprises reacting ester of thioacid with hydrogen in presence of a sulfactive hydrogenation catalyst. No. 2,402,642. Wilbur Lazier and Frank Signaigo to E. I. du Pont de Nemours & Co.

Production of thiols which comprises catalytically hydrogenating sulfurized ethylenic compound in presence of sulfactive hydrogenation catalyst. No. 2,402,643. Wilbur Lazier, Frank Signaigo and James Werntz to E. I. du Pont de Nemours & Co.

Production of mercapto carboxylic compounds which comprises catalytically hydrogenating sulfurized ethylenic carboxylic compound. No. 2,402,644. Wilbur Lazier, Frank Signaigo and James Werntz to E. I. du Pont de Nemours & Co.

Preparation of thionaphthols which comprises bringing naphthalene and sulfurizing agent into contact with sulfurization catalyst, and reducing resulting sulfurized napthalene to product containing thionaphthols. No. 2,402,645. Wilbur Lazier, Frank Signaigo and Leonard Wise to E. I. du Pont de Nemours & Co.

Manufacture of water soluble sulphuric ester salts of phenols selected from monohydric phenols and polyhydric phenols, which comprises reacting phenols in aqueous alkaline medium with sulphur trioxide compounds of tertiary amines. No. 2,402,647. Hans Lecher, Mario Scalera and Elizabeth Hardy to American Cyanamid Co.

Production of a hydroxythiol which comprises reacting aliphatic hydroxymultisulfide with hydrogen in presence of sulfactive hydrogenation catalyst. No. 2,402,665. William Peppel and Frank Signaigo to E. I. du Pont de Nemours & Co.

Recovering pure beta-picoline from basic oil mixtures containing beta- and gamma-picoline comprising reacting gamma-picoline with cyclic aldehyde selected from benzaldehyde and furfural in presence of ketone and thereafter separating unchanged beta-picoline. No. 2,402,667. George Riethof to Pittsburgh Coke & Chemical Co.

Production of aryl polysulfide which comprises reacting aromatic hydrocarbon with sulfur halide in presence of metal halide. No. 2,402,685. Frank Signaigo to E. I. du Pont de Nemours & Co.

Hydrogenation of aryl sulphides. No. 2,402,686. Frank Signaigo to E. I. du Pont de Nemours & Co.

Production of thiols which comprises bringing compound selected from organic sulfur compounds in which sulfur is joined to organic radical by a plural bond, compounds in which sulfur forms bridge between organic radicals, and compounds containing sulfur-oxygen bond, into contact with hydrogen, in presence of catalyst containing iron sulfide. No. 2,402,694. Herbert Tanner to E. I. du Pont de Nemours & Co.

Preparations of thiols which comprises catalytically hydrogenating sulfurized cyclic terpene compound in presence of sulfactive hydrogenation catalyst. No. 2,204,698. James Werntz to E. I. du Pont de Nemours & Co.

Producing neutral ester of molecularly dehydrated phosphoric acid which comprises reacting anhydrous tri-ester of orthophosphoric acid with phosphorous pentoxide. No. 2,402,703. Willard Woodstock to Victor Chemical Works.

Purifying crude carbon disulphide comprising adding water to carbon disulphide and then distilling crude carbon disulphide in presence of added water. No. 2,402,785. Max Spealman to Stauffer Chemical Co.

Reaction product of oxazolines resulting from combination of acid selected from lactic, citric, tartaric, mucic acid, unsubstituted aliphatic monocarboxylic acids, and hydroxyacetic acid with oxazoline. No. 2,402,791. Herbert Wampner to Commerial Solvents Corp.

Preventing polymerization of liquid composition comprising vinyl compound which compries incorporating therein member of group consisting of N-nitroso amines and p-nitroso diaryl amines. No. 2,402,806. John Durland to Monsanto Chemical Co.

Surface-active agents diesters of triisobutenyl succinic acid, one esterifying group of diester being hydroxy sodium sulfo propyl group and other being alkyl radical having 6 to 12 carbons. No. 2,402,823. Lucas Kyrides to Monsanto Chemical Co.

Preparation of dicarboxylic acid composition and purification of composition, said composition having corrosion inhibiting properties. No. 2,402,825. Lawrence Lovell and Edward Jahn to Shell Development Co.

Producing alkylated aromatic hydrocarbons which comprises subjecting aromatic hydrocarbon and olefin to contact in presence of catalyst containing ferrous chloride. No. 2,402,847. Louis Schmerling and Vladimir Ipatieff to Universal Oil Products Co.

Dehydrogenating hydrocarbons which comprises contacting hydrocarbon with catalyst comprising alumina and chromia and oxide of metal selected from manganese, copper, cerium and thorium. No. 2,402,854. Charles Thomas to Universal Oil Products Co.

Non-crystalline, light yellow, resinous material composed essentially of trichlor alpha nitronaphthalene. No. 2,402,872. Frank Clark to General Electric Co.

Reacting butadiene with hydrogen cyanide by bringing same in contact in presence of Friedel-Crafts type catalyst. No. 2,402,873. Donald Coffman and Leroy Salisbury to E. I. du Pont de Nemours & Co.

Dehydration of sulphur alcohols to form unsaturated thio-ethers. No. 2,402,878. Thomas Doumani to Union Oil Co. of California.

Making diolefin sulphone by reaction of conjugated diolefin with sulphur dioxide in liquid phase under superatmospheric pressure at between 60°C. and 150°C. No. 2,402,891. George Hooker, Lewis Drake and Stephen Stowe to The Dow Chemical Co.

Preparation of paracymene from monocyclic terpenes which comprises passing vapors of terpenes over palladium catalyst, improvement which consists in confining catalyst in walls with surfaces consisting of metal from copper and silver. No. 2,402,898. William Kirkpatrick to Hercules Powder Co.

Decarboxylating anacardic acid content of anacardic acid-containing liquid susceptible to foaming upon heating, within confined space having volume greater than that of the liquid, which comprise heating liquid to decarboxylate anacardic acid in liquid with liberation of carbon dioxide; and subjecting heated liquid to pressure created in confined space by carbon dioxide liberated to reduce volume of foam produced. No. 2,402,940. Norton Berry and Roland Kremers to General Food Corp.

Producing acetaldehyde which consists in passing mixture of steam, air and acetylene over inert porous material impregnated with catalyst, including mercuric sulphate, which facilitates vapor phase hydration of acetylene to acetaldehyde, the air constituent of mixture being in excess of requirements of vapor phase reaction to insure reoxidation of catalyst in situ by oxygen of air. No. 2,402,958. Alfred Globus.

Separating gaseous mixture of hydrogen chloride and chloromethane from group of methyl chloride, dichloromethane, chloroform and carbon tetrachloride. No. 2,402,978. Glenn Allen, Jr., Robert Heitz and George Henderson to The Dow Chemical Co.

Alkylating aromatic compounds which comprises contacting aromatic compound with tertiary aliphatic mercaptan in presence of alkylation catalyst of Friedel-Crafts Type. No. 2,403,013. Jacob Meadow to Socony-Vacuum Oil Co.

Surface-active agents consisting of sulfonates of dialkyl esters of alloöcimenemaleic anhydride adduct. No. 2,403,038. David Aelony to Monsanto Chemical Co.

Separating isomers of piperylene which comprises reacting mixture of isomers with sulfur dioxide so that low-boiling piperylene and sulfur dioxide form monomeric piperylene sulfone, separating sulfone and recovering high-boiling piperylene from unreacted materials, and decomposing sulfone to liberate low-boiling piperylene. No. 2,403,054. David Craig to The B. F. Goodrich Co.

Manufacture of dialkyldiarylureas, comprising interacting carbonyl chloride with mixture containing dialkylarylamine and monoalkylarylamine. No. 2,403,068. Arvel Franz and Leslie Juel to Olin Industries, Inc.

1,2-propylene glycol bis (allyl carbonate). No. 2,403,113. Irving Muskat and Franklin Strain to Pittsburgh Plate Glass Co.

Alkylation of benzene which comprises reacting in presence of Friedel-Crafts catalyst, benzene, an olefin and polyalkylbenzenes and supplying liquid feed comprising benzene and hydrogen chloride. No. 2,403,124. Edward Rosenquist and Roy Sudhoff to Monsanto Chemical Co.

Purifying naphthalene in solid state. No. 2,403,127. John Schulze.

Increasing density of char which comprises: impregnating char with liquid medium which on distillation will yield carbonaceous residue; facilitating impregnation by inducing partial vacuum in pores of char during impregnation, etc. No. 2,403,140. Alfred Thomsen to Pacific Acetate and Chemical Co.

Preparation of preferentially oil-soluble sulphonic acid soaps in which hydrocarbon oil is treated with fuming sulphuric acid, acid sludge separated and sour oil neutralized to form oil-soluble sulphonates, improvement comprising contacting sour oil with solid sorbent material whereby unreacted sulphuric acid is removed. No. 2,403,185. Norman Lemmon, David Bransky and Eugene Langan to Standard Oil Co.

Producing dielectric which comprises heating mixture of dry monochloronaphthalene, adding activated aluminum oxide and sulphur chloride. No. 2,403,206. Massimo Baer to Cornell-Dubilier Electric Corp.

Production of salts of polyfluoro organic acids which comprises reacting polyfluoroethylene containing fluorine atoms, with inorganic sulfurous acid salt. No. 2,403,207. Paul Barrick to E. 1. du Pont de Nemours & Co.

Manufacture of water soluble sulphuric ester salts of leuco quinones which comprises reacting leuco quinones with sulphur trioxide compounds of tertiary amines in alkaline aqueous medium. No. 2,403,226. Hans Lecher, Mario Scalera and Charles Lester to American Cyanamid Co.

Dehydrogenating butylenes to produce butadiene. No. 2,403,276. Arthur Green to Standard Oil Development Co.

Dealkylation of alkylated cyclopentanes to produce cyclopentane. No. 2,403,281. Ralph Hill and Howard Codet to Standard Oil Development Co.

Hydrogenating olefins. No. 2,403,288. Henry Kohler to Standard Oil Development Co.

Making artificial carbon pieces by casting, comprising subjecting coherent, pasty mixture of carbon and binder to mechanical vibrations of frequency of 6000 per minute and then baking pieces. No. 2,403,301. Andre Richon, Sous-Geronde, Chippis, Valais, Switzerland.

New composition consisting of oxyalkylated, oxidized resultant of acetalization reaction product of member of ricinoleic acid, polyricinoleic acid and their esters, with member of aldehydes and ketones. No. 2,403,343. Melvin De Groote to Petrolite Corp. Ltd.

Sub-resinous esterification product of formula described in patent. No. 2,403,344. Melvin De Groote to Petrolite Corp., Ltd.

Substituting low alkyl radicals for some of halogen atoms in halogenosilane which comprises bringing mixture comprising halogenosilane and lower alkyl halide into contact with metal selected from aluminum and zinc. No. 2,403,370. Dallas Hurd to General Electric Co.

Producing stable aquesous oil-in-water emulsions of thickened esters, which comprises emulsifying in water by aid of emulsifying agent a polyhydric alcohol ester of a poly-unsaturated long chain fatty acid, to form oil-in-water emulsion and subjecting emulsified particles to oxidation with hydrogen peroxide in presence of drier. No. 2,403,408. Paul Stamberger.

Making soap and recovering glycerine from glycerides, which comprises,

splitting glycerides to produce mixture of glycerine, fatty acids and water, adding saponifying agent to convert fatty acids into soap. No. 2,403,413. Benjamin Thurman to Benjamin Clayton.

Ester derived by reaction between reactive polybasic carboxy acid compound and member of class of drastically-oxidized, hydroxyacetylated ricinoleic acid compound, a hydroxyacetylated, drastically-oxidized ricinoleic acid compound, etc. No. 2,403,345. Melvin De Groote, Bernhard Keiser and Arthur Wirtel to Petrolite Corp., Ltd.

Paints, Pigments

Printing composition comprising water insoluble pigment hydrophilic film forming polyhydroxylated substance selected from amylaceous substances, natural gums and polyvinyl alcohols, and antimony compound from oxides, antimonates and free acids in which antimony exists in pentavalent state. No. 2,401,755. Ira Griffin, Dave Truax and Norman Nuttall, to Stein, Hall & Company, Inc.

Producing fine pigment powder by dry-grinding an organic pigment, with water-soluble agent in solid form, improvement which consists of employing a weight of the agent not less than 4 times weight of pigment, and conducting grinding operation in apparatus adapted to grind materials by attrition and shearing as distinguished from impact. No 2,402,167. Joseph Lang and Stanley Detrick to E. I. du Pont de Nemours & Co.

Visual distinction between green vegetation and common green paints which match in green portion of visible spectrum which comprises alternately viewing landscape through two filters, one transmitting light from 670 millimicrons to red end of visible spectrum and second light from 625 milliicrons to 670 millimicrons. No. 2,402,786 Edwin Stearns and William Shurcliff to American Cyanaid Co.

Making alkali-resistant iron blue, which comprises reacting solution of sodium ferrocyanide and ammonium sulphate with solution of ferrous sulphate to form precipitate, adding solution of manganese sulphate, adding sulfuric acid and oxidizing to pigment ferric ferrocyanide with solution of sodium bichromate. No. 2,402,824. Edward Large to American Cyanamid Co.

Paint composition for metal surfaces subjected to high temperatures comprising drying oil vehicle and inorganic component which reacts upon fusion to form vitreous film, said inorganic component consisting of blue lead and boric acid which to form vitreous film of lead borate. No. 2,402,864. Paul Zurcher to Continental Oil Co.

Making white pigmentary material having as essential ingredient a magnesium-titanium-oxygen compound having empirical formula $3TiO_2 2MgO$, characterized by crystalline structure which produces diffraction pattern typical of crystalline compound of cubic symmetry and sulvanite structure. No. 2,403,228. Andrew McCord and Harold Saunders to The Sherwin-Williams Co.

Non-aqueous paint comprising drying oil vehicle forming hard, dry elastic film, said vehicle having added thereto methyl dichlorostearate, said paint also including high flash point amine from triethanol amine, methanol amine, triamyl amine, tributyl amine and aniline to reduce skin forming tendency. No. 2,403,423. Paul Zurcher to Continental Oil Co.

Paper, Pulp

Making paper which comprises incorporating into suspension of fibers, water-swollen particles of polyvinyl alcohol, which particles will swell in cold water and will dissolve in water at above 130° F. No. 2,402,-469. William Toland and Benjamin Burbank.

Sheet of water absorbent paper coated with coating consisting of water soluble binder and calcium carbonate and tartaric acid held by binder in reactive relationship, coating may be destroyed by dipping coated sheet in water. No. 2,402,542. Chauncey Foote, Jr. and Clifford Guertin to American Bank Note Co.

Petroleum

Separating aromatic hydrocarbons from naphtha hydrocarbon mixture containing aromatic and non-aromatic hydrocarbons including olefins, paraffins and naphthenes which comprises extracting naphtha with a solvent consisting of water containing compound selected from aliphatic amines having 1 to 5 amine residues. No. 2,401,852. George Arnold and Harold Atwell to Texas Co.

Manufacture of gasoline hydrocarbons by catalytic conversion of normally gaseous hydrocarbons including olefins and paraffins involving reactions of alkylation and isomerization separately effected by action of common aluminum halide catalyst. No. 2,401,859. Louis Clarke to Texas Co.

Production of liquid hydrocarbons of high octane number and low acid heat value from olefins which comprises passing olefin in admixture with light isoparaffin in contact with catalyst comprising association of acidic oxide and amphoteric oxide. No. 2,401,865. Manuel Gorin, Everett Gorin, and Lord Sharp, Irving Welinsky, to Socony-Vacuum Oil Co., Inc.

Pyrolytic reaction of normally gaseous hydrocarbons of higher molecular weight than methane to form higher boiling hydrocarbons by scission and polymerization using alkylene oxide, which can be volatilized without decomposition, to promote pyrolytic reaction. No. 2,401,922 Frederick Frey, Harold Hepp, Glen Murray, to Phillips Petroleum Co.

Catalytically synthesizing paraffinic hydrocarbons of gasoline boiling range which comprises alkylating isoparaffin in liquid phase with ethylene in presence of solution of aluminum bromide in paraffinic hydrocarbon solvent as catalytic agent. No. 2,401,925. Manuel Gorin, to Socony-Vacuum Oil Co., Inc.

Producing lubricating oil which comprises providing mixture of liquid isobutylene, representing 40% to 60% spraying mixture with solution of Friedel-Crafts type catalyst in lower alkyl halide, at temperature between −10° C. and +35° C. No. 2,401,933. Arthur Hersberger to The Atlantic Refining Co.

Cracking hydocarbons which comprises subjecting hydrocarbons in absence of solid catalysts to suitable cracking conditions in presence of p-dibromo-benzene. No. 2,402,034. Hillis Folkins and Carlisle Thacker to The Pure Oil Co.

Alkylation of isobutane with ethylene in presence of aluminum chloride-hydrocarbon complex liquid catalyst. No. 2,402,126. Louis Clark to The Texas Co.

Production of motor fuel by alkylation of isobutane with low-boiling olefins. No. 2,402,328. Eugene Herthel to Sinclair Refining Co.

Petroleum naphtha subjected to thermal conversion and then to extraction with sulphur dioxide, steps of eliminating from naphtha after conversion any organic peroxides and oxygen containing therein, and excluding oxygen from atmosphere with which naphtha may come into contact until extraction with sulphur dioxide has been completed. No. 2,402,425. Herbert Meier to Standard Oil Development Co.

Improving ignition quality of liquid hydrocarbon Diesel fuel for solid injection compression-ignition engine which comprises contacting fuel as fed to combustion zone with mass of normally solid partially soluble sulfur-free ignition promoter. No. 2,402,427. Pharis Miller and Eugene Lieber to Standard Oil Development Co.

Treating oil wells in which water is present which comprises forcing liquid capable of reducing surface tension of water into oil-producing stratum below bottom of well, thereafter introducing second liquid consisting of carbon tetrachloride to displace water, etc. No. 2,402,-433. John Munn to Chemical Service Co.

Selectively sealing off flow of fluid through undesirable fluid-passing porous rigid sand formations exposed to oil well comprising flowing into well solution of sodium silicate. No. 2,402,588. Kurt Andresen to Essex Royalty Corp.

Extracting sulphurbearing and aromatic constituents from naphtha hydrocarbon mixture comprising aliphatic, alicyclic, aromatic hydrocarbons and sulphurbearing compounds. No. 2,402,799. George Arnold and Harold Atwell to The Texas Co.

Refining hydrocarbon oil, which comprises contacting oil with finely divided decolorizing metal silicate absorbent. No. 2,404,804. Vladimir Chechot to The Atlantic Refining Co.

Producing triptane which comprises isomerizing normal heptane to produce methyl hexanes and ethyl pentanes therefrom, separating fraction boiling from 90° C. to 92° C., subjecting fraction to controlled isomerization to produce dimethylpentanes, separating fraction boiling from 75°C., to 90°C., and subjecting fraction to isomerizing conditions to convert portion thereof into 2,2,3-trimethylbutane. No. 2,402,-807. Gustav Egloff to Oil Products Co.

Isomerization of saturated hydrocarbons wherein hydrocarbons are subjected to action of metal halide isomerizing catalyst in presence of hydrogen halide. No. 2,402,817. John Iverson to Universal Oil Products Co.

Isomerization process which comprises contacting saturated hydrocarbon with metal halide isomerizing catalyst in presence of hydrogen halide, etc. No. 2,402,818. John Iverson to Universal Oil Products Co.

Non-dehydration process for removing water-dispersible impurities from impure mineral oil containing small dispersed brine droplets with which are associated portion impurities to be removed and oil containing emulsifying agents. No. 2,402,844. Claudius Roberts to Petrolite Corp., Ltd.

Isomerizing hydrocarbons by contact with metallic halide-hydrocarbon complex isomerization catalyst. No. 2,402,858. Halsted Warrick to The Texas Co.

Naturally unstable gasoline stablized against oxidation by addition of a a cycloolefin possessing single olefinic double bond in naphthenic ring. No. 2,402,863. Hilbert Zuidema and John Mital to Shell Development Co.

Producing trade gas oil of low sulfur content from high sulfur-bearing oil. No. 2,402,863. Stewart Hulse to Standard Oil Development Co.

Treating oils which comprises contacting oil with adsorbent composed of alumina and fuller's earth, said alumina being adsorptive product prepared by heating substance selected from aluminum hydrates and alumina in gelatinous form. No. 2,403,088. Kenneth Laing to Aluminum Co. of America.

Catalytic hydrocarbon conversion process wherein saturated hydrocarbons are contacted with catalyst comprising solution of aluminum chloride in antimony trichloride. No. 2,403,107. Sumner McAllister, John Anderson and William Ross to Shell Development Co.

Isomerization of normal butane to form isobutane. No. 2,403,181. Jean Jones to Phillips Petroleum Co.

Fuels for aircraft engines. No. 2,403,268. Garland Davis, William Sweeney and Walter Herbst to Standard Oil Development Co.

Production of high octane number fuels. No. 2,403,279. Amiot Hewlett to Standard Oil Development Co.

Removal of H_2S from gases which comprises scrubbing gas with liquid mixture containing combination of basic material and slightly acidic material of phenolic type of compound, and carrying in suspension an adsorbent having preferential adsorbtivity for acidic substances. No. 2,403,319. Milton Williams to Standard Oil Development Co.

Alkylation of isobutane with ethylene improvement which comprises introducing simultaneously with isobutane a normally liquid paraffinic straight-run gasoline fraction containing paraffin and isomerizing normal paraffin during alkylation of isobutane, whereby to increase antiknock value and form saturated fuel. No. 2,403,342. Roland Day to Universal Oil Products Co.

Isomerizing paraffin containing at least 4 carbon atoms while in contact with Friedel-Crafts type catalyst and in presence of alkyl sulfide. No. 2,403,314. Carl Tongberg to Standard Oil Development Co.

Photographic

Forming corrected image in natural colors in multi-layer photographic material having superposed layers sensitive in order to blue, green and red regions of spectrum, blue-sensitive layers having additional sensitivity in region to which green sensitive and red sensitive layers are not sensitive. 22,764. Le Roy Dearing to Eastman Kodak Co.

Manufacturing photosensitive electrode which comprises depositing film of antimony on electrically conductive foundation in a non-oxidizing atmosphere, etc. No. 2,401,735. Robert Janes, and Alan Glover, to Radio Corporation of America.

Producing magenta color photographic image in gelatino silver-halide emulsion layer which comprises exposing layer and developing it with aromatic primary amino developing agent in presence of coupler compound having formula described in patent. No. 2,403,040. Abraham Bavley to General Aniline & Film Corp.

Substituted-2,5-diketo-7-methyl-pyrimidopyrazoles as couplers for color photography. No. 2,403,329. Abraham Bavley, to General Aniline & Film Corp.

Additional patents on all other classifications from the above volumes will be given next month.

Abstracts of Canadian Patents

Collected from Original Sources and Edited

Requests for further information or photostated copies of the patents reported below should be addressed to the Commissioner of Patents and Copyrights, Department Secretary of State, Ottawa, Canada

CANADIAN PATENTS

Granted and Published May 14, 1946

Covering for an arc welding electrode comprising 5 per cent to 30 per cent carbohydrate and 15 per cent brucite by weight. No. 434,667. David L. Mathias.

Para-sulfamylanilino amino 1, 2, 4-triazole. No. 434,702. Canadian General Electric Company Ltd. (Gaetano F. D'Alelio).

Production of chlorine dioxide by reaction between chlorine and a solid chlorite. No. 434,732. The Mathieson Alkali Works (Willis S. Hutchinson, Dale K. Mecham).

Dry composition containing calcium hypochlorite and from about 5% to about 10% of sodium tetraphosphate. No. 434,733. The Mathieson Alkali Works (James D. MacMahon).

Hard wax substitutes containing major portions of alkylolamides of the fatty acid radicals occurring in hydrogenated castor oil. No. 434,739. National Oil Products Co. (Maurice Joseph Kelley).

Permanently refusible zinc resinate. No. 434,742. Newport Industries Inc. (Robert C. Palmer, Edwin Edelstein).

Method of preparing di-esters of 3,3'-methylenebis-4-hydroxycoumarin. No. 434,790. Wisconsin Alumni Research Foundation (Mark A Stahmann, Karl Paul Link).

Process of preparing 5-5-C-C-cycloheptenyl-alkyl barbituric acids. No. 434,802. Wilhelm Taub.

Photographic developer comprising developing agents and as a blue toning agent diethylthiobarbituric acid. No. 434,803. Fritz Dersch, Newton Heimbach.

Granted and Published May 21, 1946

Adhesive wear-resisting reinforcement patch for a garment comprising thermoplastic material capable of being laundered or dry-cleaned. No. 434,831. Frank Milton Prestwich.

Dope for treating fabrics comprising a solution of the material obtained by chlorinating solid polythenes. No. 434,857. Canadian Industries Ltd. (James Robertson Myles, Donald Whittaker, Francis Joseph Siddle).

Oil-and-grease-resistant heat sealable pellicle comprising a base film of regenerated cellulose coated on one side at least with a composition consisting of 39% by weight of polyvinyl acetate, 39% by weight of nitrocellulose and 22% by weight of di(ethylene glycol monomethyl ether) phthalate. No. 434,860. Canadian Industries Ltd. (James Albert Mitchell, Daniel Deacon Lanning).

Reducing fog in a photographic silverhalide emulsion by exposing said emulsion and developing it in the presence of thiosalicylic acid. No. 434,864. Canadian Kodak Co. Ltd. (Harold D. Russell).

In the purification of zinc electrolytes by means of metallic precipitants, the step of contacting the electrolyte with zinc dust coated with copper and indium as the precipitant. No. 434,890. Hudson Bay Mining and Smelting Co. Ltd. (Dinsmore Laurence Griffith, Luther Glenn Hendrickson).

Vulcanizable composition containing one to two parts of mica for each part of rubber and sulphur in a sufficient amount as to give a hard vulcanized rubber. No. 434,892. Jefferson Electric Company (Arthur D. Little, Inc., Charles Gordon Harford).

Granted and Published May 28, 1946

Treating liquid media to remove cations therefrom by contacting with an infusible resinous cation-exchange body which is the reaction product of a phenol and aldehyde, and an aliphatic amino-carboxylic acid. No. 434,966. Canadian General Electric Company, Ltd. (Gaetano F. D'Alelio).

Process of reacting the surface of a pre-formed cellulose compound with acrylonitrile. No. 434,970. Canadian Industries Ltd. (Ray Clyde Houtz).

Traveller the wearing surface of which comprises a plasticized cellulose acetate butyrate. No. 434,973. The Clark Thread Company (William Merry Camp).

Cell for the electrolysis of magnesium chloride fusions. No. 434,979. The Consolidated Mining and Smelting Company of Canada Ltd. (Robert B. MacMullin).

Subjecting a filament of a normally crystalline vinylidene chloride polymer in the supercooled state to the simultaneous operations of stretching and false twisting. No. 434,984. The Dow Chemical Company (Alden W. Hanson).

Circulating fluid for deep wells comprising a well mud fluid to which has been added a substantial portion of fragmented cellophane foil. No. 434,985. The Dow Chemical Company (John B. Stone).

Insulating material comprising a mixture of comminuted insoluble polystyrene in a matrix of plasticized polystyrene. No. 434,987. Federal Telephone and Radio Corp. (Arthur James Warner).

Cementitious material comprising a water soluble partial condensation product of urea-formaldehyde, soy-bean meal impregnated with a cured phenol formaldehyde resin and monoammonium phosphate. No. 434,988. Ford Motor Company of Canada Ltd. (Henry Ford, Robert Allen Boyer, Paul John Beyer).

Engaging and disengaging mercury clutch. No. 435,002. Mercury Clutch Corporation (Hans J. Zimmermann).

Forming zirconium oxide refractories of high resistance to thermal shock by moulding into shape and firing in a carbonaceous reducing atmosphere at a temperature above 1900°C. No. 435,029. The Titanium Alloy Manufacturing Company (Eugene Wainer).

Pile fabric made crease-resistant by an aldehyde anti-crease reagent and made water-repellent by an organic nitrogen compound. No. 435,045. Tootal Broadhurst Lee Company Ltd. (Joseph Tankard, Frederick Charles Wood).

Pentaerythritol manufacturing process. No. 435,051. Camille Dreyfus (Joseph E. Bludworth).

Granted and Published June 4, 1946

Method of making bags for hydraulic accumulators. No. 435,075. Jean Mercier.

Method of storing gas pumping under pressure in a preformed impervious cavity in a natural salt bed beneath the surface of the earth. No. 435,080. Reginald Lancaster Pattinson.

Preparing a thermosetting resin capable of being cured without further addition of catalyst by condensing with an aldehyde about the material obtained upon heating dicyandiamide and a phenol with evolution of ammonia. No. 435,085. American Cyanamid Company (Frank J. Groten and James H. Lower).

Resinous product of reaction of an aldehyde and an aliphatic ester of a (diamino pyrimidyl thio) substituted acetic acid. No. 435,100. Canadian General Electric Company, Ltd. (Gaetano F. D'Alelio and James W. Underwood).

Method of making siliconized silicon carbide articles. No. 435,119. The Carborundum Company. (Albert Herman Heyroth).

Chemically inert resin composition prepared by heating a mixture containing furfural and furfuralcohol copolymer of vinyl chloride and vinyl acetate. No. 435,145. Kewaunee Manufacturing Company. (The Institute of Paper Chemistry, Harry F. Lewis).

Improving the resistance to corrosion of magnesium and magnesium base alloys by treatment with an aqueous solution which contains 15 parts of a bichromate of an alkali metal and about 7½ parts of concentrated nitric acid to 100 parts of water. No. 435,147. Magnesium Elektron Ltd. (Charles James Bushrod).

Liquid composition for coating paper, consisting of a solution of Gum Dammar in Toluene having emulsified therein a polyhydric alcohol printing solution. No. 435,151. The National Cash Register Co. (Barrett K. Green).

Method of making bags from a continuous strip of heat sealable material dividable into bag sections. No. 435,165. E. S. & A. Robinson Ltd. (Arthur William Richens).

Rendering cellulosic fabrics more resistant to crushing as well as water-repellent by impregnating the fabric with a resin-forming crease-resistant agent and with a quaternary ammonium salt of a methyl chloride derivative of a carbamyl compound. Tootal Broadhurst Lee Co. Ltd. (Frederick Charles Wood).

Articles transparent to visible light substantially opaque to ultra-violet light consisting of a plastic cellulose acetate material having incorporated therewith 0.75 per cent on the weight of the cellulose acetate material of fluoranthene. No. 435,187. Camille Dreyfus. (William Horback).

Increasing the stability of a diazo-type light-sensitive layer containing a suitable diazo compound adding to the coating solution an alpha-beta-unsaturated acrylic acid. No. 435,190. Maximilian K. Reichel.

Granted and Published June 11, 1946

Textile materials of improved properties, comprising curled staple fibres of glass and staple fibres of another textile material. No. 435,202. Camille Dreyfus.

Process of making ethylene oxide by the direct chemical combination of ethylene with oxygen at temperatures between about 150° and about 400°C. in the presence of a surface catalyst. No. 435,242. Carbide and Carbon Chemicals Ltd. (George H. Law).

Production of 2,2,3 trichloro- and tribromo-alkanal-1 compounds and hydrates. No. 435,259. The Pennsylvania Salt Manufacturing Co. (Ralph Lyman Brown and Ralph Eugene Plump).

Electropolishing of metallic tantalum by making it anodic in an electrolyte, containing 2 per cent-7 per cent by weight of hydrofluoric acid and 32 per cent-38 per cent by weight of hydrochloric acid. No. 435,261. The Pennsylvania Salt Manufacturing Co. (John Frederick Gall and Henry Conrad Miller).

Resinous polymerization product of vinyl chloride and vinyl acetate containing 85 to 88 per cent vinyl chloride and a normally liquid aliphatic ketone having an alkenyl radical directly attached to the carbonyl carbon atom. No. 435,285. Shell Development Co. (Leo V. Steck, Franklin A. Bent).

Granted and Published June 18, 1946

Pure, anhydrous, light-stable, opaque, white pigment consisting essentially of lead silicate and not more than 5 per cent of a chemically combined alkaline earth metal oxide. No. 435,300. Louis Edward Barton.

Light-stable, opaque, white pigment consisting of essentially pure basic lead silicate with a halogen chemically combined therewith. No. 435,302. Louis Edward Barton.

Composition for making a light-transforming surface comprising alkali metal salt of rhodamine B hydrochloride and a binder. No. 435,329 Canadian General Electric Company, Ltd. (Gorton R. Fonda).

Photographic emulsion containing polyvinyl alcohol as the carrier for the photosensitive element hardened by a melamine-formaldehyde hardener. No. 435,332. Canadian Kodak Company, Ltd. (Wesley G. Lowe and William F. Fowler.

Seal in which bright tungsten wire passes through completely degasified

(Continued on following page)

(*Continued from preceding page*)

hard glass without leakage. No. 435,338. Canadian Westinghouse Company, Ltd. (George Meister).

Method of capsulating sodium chloride in a gelatin capsule. No. 435,350. Gelatin Products Corporation (Robert D. Cook and Sereck H. Fox).

Process for the manufacture of a new degraded cellulose ether which is partially soluble in dilute caustic alkali solution and substantially insoluble in water and is brittle and friable when dry. No. 435,388. Antoine Lilienfeld.

Bonding together surfaces of cellulose by applying a composition containing polyvinyl alcohol, an aldehyde and a substance capable of catalyzing the acetalization of the alcohol by the aldehyde. No. 435,389. Claude George Bonard (Robert Pierce Roberts and Kenneth Jones).

Method for the simultaneous dephosphorization and deoxidization of steel with concomitant introduction of manganese in the steel. No. 435,390. Societe d'Electrochimie, d'Electrometallurgic et des Acieries Electriques d'Ugine (Rene Perrin).

Granted and Published June 25, 1946

Pure, substantially white, opaque pigment consisting of basic lead silicate and containing 79 to 88 per cent lead oxide and the balance silica. No. 435,396. Lewis Edward Barton.

Apparatus for controlling vaporization and volatilization of liquids at normal temperatures without the addition of heat. No. 435,429. Henry Alfred Ernest Talley.

Making polyamides by heating at approximately 150° to 300° C. a diamine each of the amino nitrogens in whose amide-forming groups carries at least one hydrogen atom and dicarboxylic acids and amide-forming derivatives thereof having a tertiary amino nitrogen atom connected to other atoms by single bonds only in the chain of atoms separating its acid groups. No. 435,450. Canadian Industries Ltd. (Julian Werner Hill).

Forming polymeric methyl methacrylate from monomeric methyl methacrylate by removing dissolved oxygen from monomer and polymerizing in the presence of peroxide catalyst. No. 435,451. Canadian Industries Ltd. (E. I. du Pont de Nemours & Co., Norton Co., Carl E. Barnes).

Phosphite of a compound selected from the group consisting of esters and amides of hydroxyacetic acid. No. 435,455. Canadian Industries Ltd. (Melvin Adam Dietrich).

An explosive composition comprising ammonium nitrate, a sensitizing agent, and between 1 per cent and 9 per cent barley meal. No. 435,456. Canadian Industries Ltd. (Clarence Herman Winning).

N-(3-Halo-2-hydroxyalkyl) aminoaromatic sulphonic acids and their water-soluble salts. No. 435,458. Canadian Industries Ltd. (David Willcox Woodward).

Synthesizing chloroprene by bringing monovinyl acetylene in admixture with hydrogen chloride into contact with gold chloride. No. 435,459. Canadian Industries Ltd. (Wilbur Arthur Lazier).

Preparation of furan by bringing a vapor mixture of furfural and steam into contact with a catalyst containing a cromite selected from the group consisting of zinc, manganese, cadmium and tin. No. 435,463. Canadian Industries Ltd. (Gerald Messner Whitman).

Alcoholic antifreeze reinhibitor composition consisting chiefly of borax and mercaptobenzothiazole in the proportion of 0-01 to 0-10 part by weight of mercaptobenzothiazole per part of borax. No. 435,464. Canadian Industries Ltd. (Edwin Hastings Keller).

Making magnesium sulphate by calcining a magnesia-bearing mineral in an atmosphere containing oxides of sulphur. No. 435,490. Idaho Maryland Mines Corp. (Hellmuth R. Brandenburg).

Manufacture of 5-chloro-5-bromo and 5-iodo-pentanone-2 by causing 1-acetobutyrolactone to interact with the appropriate hydrogen halide. No. 435,495. Imperial Chemical Industries Ltd. (William Robert Boon).

Improved process for producing chlorine dioxide by reacting a metallic chlorate with a gaseous reducing agent. No. 435,509. Mo Och Domsjo Aktiebolag (Torsten Gustaf Holt).

Solid bullet lubricant comprising 23½ per cent microcrystalline petrolatum wax, 28 per cent ozokerite, 25 per cent oleostearine and 23½ per cent petrolatum. No. 435,519. Remington Arms Co., Inc. (Thomas Bailey Curran and Albert Adam Schilling).

Preparing high wet-strength paper by treating with an aqueous solution of a partial condensation product of urea and formaldehyde, containing substantially one hundredth of one per cent to one quarter of one per cent of a quaternary nitrogen compound. No. 435,523. Tootal Broadhurst Lee Co., Ltd. (Harry Corteen).

Producing an arylidene amine by reacting an hydroxy aryl dithio acid with an aryl amine. No. 435,531. Wingfoot Corp. (Albert Foster Hardman).

Granted and Published July 2, 1946

Method of preparing granular superphosphate. No. 435,565. Herman B. Siems.

Removing solid materials from waste water produced in the manufacture of paper by subjecting waste water to a froth flotation treatment in the presence of an ammonium soap of talloel. No. 435,603. Chemical Construction Corp. (Robert B. Booth).

As an artificial bristle, a plastic filament having a capillary channel open along the side of the bristle. No. 435,611. Extruded Plastics, Inc. (Charles E. Slaughter).

Process for the manuacture of halogen-substituted aminoarylsulphonic acids. No. 435,613. J. R. Geigy, A. G. (Henry Martin Rudolf Hirt and Alfred Staub, Hans Heinrich Zaeslin).

Hardening photographic gelatin by incorporating therein a minor amount of a lower aliphatic nitro aldehyde. No. 435,614. General Aniline & Film Corp. (Robert H. Zappert).

Gelatino silver chloride photographic emulsions containing 6-methoxy-4-methyl-quinoline hydrochloride. No. 435,619. Ilford Ltd. (John David Kendall and Douglas James Fry).

Welding flux for welding magnesium and magnesium base alloys rich in manganese. No. 435,630. Magnesium Elektron Ltd. (Charles James Bushrod).

Granted and Published July 9, 1946

Making acrylonitrile by heating ethylene cyanohydrin and calcium hydroxide together in conjunction with a petroleum fraction of 185-215° C. boiling point range. No. 435,687. American Cyanamid Co. (Harold S. Davis and Erwin L. Carpenter)

Process for the manufacture of water-soluble, high molecular acylated α-substituted aralkyl-amines. No. 435,711. J. R. Geigy, A. G. (Carl Mettler, Henry Martin, Otto Neracher and Alfred Stauber).

Producing the laevo isomer of 2,3-butylene glycol by fermenting an aqueous mash of whole grain cereal material with an active strain of aerobacillus polymyxa at a temperature not less than 28 nor more than 38°. No. 435,716. The Honorary Advisory Council for Scientific and Industrial Research (George Aleck Ledingham and Gordon Albert Adams).

Process of drying wheat gluten which includes the preliminary step of eliminating its adhesive properties. No. 435,717. The Huron Milling Company, Inc. (Charles V. Hagedon).

Fire extinguishing foam stabilizing composition suitable for making foam with hard water comprising a sulphonated organic foaming agent and a water soluble amine citrate. No. 435,733. Pyrene Development Corp. (Pyrene Manufacturing Co., Leopold Scheflan, and James C. Brown).

Corrosion-preventive composition for metals comprising a lubricating oil containing petrolatum, mahogany soap, degras and the product obtained by reacting p-cresol with isobutene in the presence of a catalytic amount of sulphuric acid at a temperature of about 70°C. No. 435,743. Standard Oil Development Company (John C. Zimmer, and Ejnar W. Carlson).

Ceramic high dielectric material composition which comprises strontium titanate and an alkaline earth stannate. No. 435,749. The Titanium Alloy Mfg. Co. (Eugene Wainer).

Granted and Published July 16, 1946

In an air and gas purifier, a filter body consisting of ground and sifted shells of molusca and a binding agent. No. 435,773. Ton Conrad Bieth.

Positive displacement pump for pumping plastic, doughy, pasty or viscous materials. No. 435,791. Fred M. Roddy.

Method of preparing mercuric guanylurea, mercuric biguanide, mercuric guanidine. No. 435,806. American Cyanamid Co. (William H. Hill).

Preparing para-acetamido anilino amino 1,2,4-triazoles, reaction under heat between (Para-acetamido phenyl) biguanide and hydrazine hydrate in the presence of an acid. No. 435,830. Canadian General Electric Co., Ltd. (Gaetano F. D'Alelio).

Separating sulphur dioxide from a gaseous mixture with an aliphatic hydrocarbon by scrubbing with an organic sulphone. No. 435,843. The Dow Chemical Co. (George W. Hooker, Lewis R. Drake, and Stephen C. Stowe).

Quinolinic acid decarboxylation consisting of heating quinolinic acid and water under pressure of a temperature of 110-160° C. No. 435,856. Merck & Co., Inc. (Jacob van de Kamp and Grover C. Paulsen, Jr.).

Crack sealer composition comprising an aqueous emulsion of bitumen mixed with 6 to 8 per cent ground particles of vulcanized rubber, 2 to 5 per cent bentonite, and 6 to 8 per cent mineral fibre. No. 435,857. The Patent and Licensing Corp. (Edwin O. Groskopf).

Granted and Published July 23, 1946

Hydrolyzing wood by treating in a closed chamber with steam in the presence of an acid catalyst and simultaneously removing from contact with the wood condensates from the steam and products of the hydrolysis reaction soluble therein. No. 435,896. Monie S. Hudson.

Making an insulin nucleotidate which comprises causing a solution of insulin to react with a solution of a nucleotide. No. 435,903. Veader Leonard.

Producing fruit flavoured sugar compositions, reacting the ash of a sugar material with acid. No. 435,918. Alexander M. Zenzes.

Method of producing high polymers, which comprises vulcanizing dihydric alcohol esters of polymeric acids derived from monomers containing radicals of octadecadienoic acids. No. 435,925. American Resinous Chemicals Co. (John C. Cowan and Waldo C. Ault).

Process for the preparation of β-methoxy ethyl glycolate. No. 435,934. Canadian Industries Ltd. (Donald John Loder and Wiber Otis Teesters).

Copolymer of asymmetrical dichloroethylene with phenyl vinyl ketone, said copolymer containing 40-95 per cent of dichloroethylene. No. 435,935. Canadian Industries Ltd. (Harold Wilfred Arnold and George Lowrance Dorough).

Process for preparing sodium ethanolamine formal N-tetracetate. No. 435,936. Canadian Industries Ltd. (Donald John Loder and William Franklin Greshman).

Textile fibre finishing composition comprising a stable aqueous dispersion of a polymerized methyl methacrylate containing an acetate of deacetylated chitin having the property of rendering to textiles a non-chalky, delustered finish. No. 435,938. Canadian Industries Ltd. (Joseph Edward Smith).

Finishing textile fibres by exhausting thereon a highly dispersed polymerized vinyl compound from a dilute aqueous suspension. No. 435,939. Canadian Industries Ltd. (Joseph Edward Smith).

Preparation of methyl hydroxyacetate by dehydrating hydroxyacetic acid, preparing a mixture consisting of the dehydrated acid with a stoichiometric excess of methanol, and esterify. No. 435,940. Canadian Industries Ltd. (Donald John Loder).

Copolymer of divinyl formal and vinyl acetate which has a softening temperature of about 35° C. No. 435,941. Canadian Industries Ltd. (Donald Drake Coffman).

Varnish comprising a glycerol mixed ester of cinnamalacetic acid with the acids of a natural drying oil, a drier, and a varnish solvent. No. 435,944. Canadian Industries Ltd. (Merlin Martin Brubaker).

Condensation product of glycerol, maleic anhydride, β-(2-furyl) acrylic acid, and a fatty oil acid. No. 435,949. Canadian Industries Ltd. (Henry Shirley Rothrock).

Soil disinfecting composition consisting in a finely divided, free-flowing product containing 1-alpha-furyl-2-nitroethylene in admixture with a solid diluent. No. 435,952. Canadian Industries Ltd. (Wendell Holmes Tisdale).

Copolymer composed of trichlorethylene and vinyl trimethylacetate. No. 435,959. Canadian Industries Ltd. (William Robert Cornthwaite and Norman Dunshee Sanborn).

Water-soluble, surface-active condensation product of one mole of 1-dodecylthiosorbitol with two moles of alpha-methyl glucoside. No. 435,961. Canadian Industries Ltd. (Paul Lawrence Salzberg and James Herbert Werntz).

Porcelain for sealing to metal and glass. No. 435,970. Canadian Westinghouse Co., Ltd. (Philip R. Kalischer and Ralston Russell, Jr.).

Aqueous soy protein spinning solution comprising the reaction of, soy protein (substantially pure) 15-25 per cent, alkali metal hydroxide .5-1.5 per cent, xanthate .05-.3 per cent, remainder being water. No. 435,985. Ford Motor Co. of Canada, Ltd. (Robert A. Boyer, William T. Atkinson and Charles F. Robinette).

Bleaching cellulosic textile materials by treating with an alkaline solution of sodium chlorite and a hypochlorite. No. 435,996. The Mathieson Alkali Works (George P. Vincent).

(*To be continued*)

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

421,897. The Franklin Glue Co., Columbus, Ohio; filed July 9, 1945; Serial No. 485,567, for powdered water-resistant casein glue; since Nov. 4, 1944.

421,916. Schwartz Chemical Co., N. Y.; filed Nov. 17, 1945; Serial No. 491,778; for dyes; since March 1943.

422,039. Lake Chemical Co., Chicago, Ill., filed Mar. 30, 1945; for pipe joint compound for preventing rust; since Oct. 1944.

422,140. Cristy Dry Gas Products, Inc., Worcester, Mass.; filed Jan. 4, 1945; Serial No. 494,261; for dehydrating agent, antifreeze agent; since Feb. 10, 1943.

470,909. Don Baxter, Inc., Glendale, Calif.; filed June 5, 1944; for alkaline detergent for cleaning laboratory glassware; since April 27, 1944.

471,938. Century Labs., Inc., Brooklyn, N. Y.; filed July 6, 1944; detergent for solution of sludge in fuel oil tanks; since June 9, 1941.

477,872. The DuBois Co., Cincinnati, Ohio; filed Dec. 23, 1944; for soap to be dissolved in water to provide coolant fluid; since June 25, 1943.

484,758. Rentokil Ltd., London, England; filed June 19, 1945; for insect destroying preparations; since 1924.

485,044. Circo Products, Cleveland, Ohio; filed June 26, 1945; for hydrocarbon solvent such as perchlorethylene; since Mar. 16, 1945.

485,663. The Standard Oil Co., Louisville, Ky.; filed July 10, 1945; for liquid for cleaning and polishing; since February 1923.

486,371. Imperial Chemical Industries, Ltd., Slough, England; filed July 27, 1945; for insecticides; since Feb. 23, 1945.

487,673. General Aniline & Film Corp., N. Y.; filed Aug. 28, 1945; for photographic chemicals; since Aug. 14, 1945.

488,249. National Lead Co., Sayreville, N. J. and N. Y.; filed Sept. 10, 1945; for cellulose fiber mixtures for well drilling fluids; since May 1, 1945.

489,173. Elgin Softener Corp., Elgin, Ill.; filed Sept. 29, 1945; for ion exchange materials; since Aug. 25, 1945.

489,598. Neilson Chemical Co. ,Detroit, Mich.; filed Oct. 8, 1945; for preparing aluminum alloys for welding and painting; since Oct. 1944.

489,600. Neilson Chemical Co., Detroit, Mich.; filed Oct. 8, 1945; for cleaning and preparing metal surfaces for painting; since September 1943.

490,044. The United States Stoneware Co., Akron, Ohio; filed Oct. 16, 1945; for synthetic initially plastic setting material; since Jan. 1938.

490,092. Waverly Petroleum Products Co., Philadelphia, Pa.; filed Oct. 17, 1945; for additive for pickling baths for control of acid mist or spray and as inhibitor against attack of clean metal by acid; since Sept. 12, 1945.

490,153. Union Carbide and Carbon Corp., N. Y.; filed Oct. 18, 1945; for powder for cutting and scarfing; since Dec. 28, 1944.

490,693. Chandler R. Parsons, as Parsons Chemical Works, Grand Lodge, Mich.; filed Oct. 29, 1945; for insecticides; since Feb. 20, 1945.

490,749. E. F. Drew & Co., Inc., N .Y.; filed Oct. 30, 1945; for hydrogenation catalyst for edible oils; since Oct. 16, 1945.

490,998. Celanese Corp. of America, N. Y.; filed Nov. 3, 1945; for reticular metallic and/or textile base covered cellulose derivative; since Oct. 30, 1945.

491,244. E. I. du Pont de Nemours & Co., Wilmington, Del.; filed Nov. 8, 1945; for luminescent chemicals; since Sept. 7, 1944.

491,346. The Liquid Carbonic Corp., Chicago, Ill.; filed Nov. 9, 1945; for carbon dioxide; since Oct. 23, 1945.

491,485. Raymond G. Lamoureaux, Inglewood, Calif.; filed Nov. 13, 1945; for wood preservative, fire retardant, termite repellent; since Oct. 17, 1945.

491,502. Polaroid Corp., Cambridge, Mass.; filed Nov. 13, 1945; for sodium chloride, photographic fixing baths; since Mar. 11, 1941.

492,004. Soil-Off Mfg. Co., Glendale, Calif.; filed Nov. 21, 1945; for non-flammable liquid paint cleaner; since June 6, 1945.

492,427. Celanese Corp. of America; filed Nov. 30, 1945; for sheets, films made of cellulosic plastic; since Nov. 24, 1945.

492,657. The Rayon Processing Co. of R. I., Inc., Central Falls, R. I.; filed Dec. 4, 1945; for macerated cotton fabric as filler for phenol formaldehyde plastics; since September 1943.

493,354. Heresite & Chemical Co., Manitowoc, Wis.; filed Dec. 15, 1945; for industrial insecticide; since Sept. 18, 1945.

494,306. Chicago Copper & Chemical Co., Blue Island, Ill.; filed Jan. 5, 1945; treatment of oil well drilling muds; since Nov. 8, 1945.

494,904. The Griffith Labs., Inc., as The Griffith Lab., Chicago, Ill.; filed Jan. 17, 1946; for insecticide in composition form; since Dec. 17, 1945.

495,087. National Lead Co., N. Y.; filed Jan. 19, 1946; for lead oxides, and metallic lead; since June 1, 1945.

495,265. American Cyanamid & Chemical Corp., N. Y.; filed Jan. 24, 1946; for potassium sodium ferricyanide and sodium ferricyanide for blueprint paper; since May 15, 1940.

495,522. Stainpruf Process Laundry as Stainpruf Co., Los Angeles, Calif.; filed Jan. 26, 1946; for waterproofing and stainproofing fabric; since Feb. 25, 1938.

495,805. Daniel J. Klein, as Allied Exterminating Co., N. Y.; filed Feb. 1, 1946; for insecticides and disinfectants; since Jan. 15, 1945.

495,867. The Cowles Detergent Co., Cleveland, O.; filed Feb. 2, 1946; for calcium hypochlorite; since Jan. 2, 1946.

495,994. The Sherwin-Williams Co., Cleveland, Ohio; filed Feb. 4, 1946; for pest inhibiting compositions; since Sept. 4, 1919.

496,238. B. Heller & Co., Chicago, Ill.; filed Feb. 8, 1946; for insecticide; since Feb. 1, 1946.

496,250. Magnolia Chemical Co., Inc., Jackson, Miss.; filed Feb. 8, 1946; for insecticides; since Jan. 1, 1932.

496,915. Lederle Labs., Inc., N. Y.; filed Feb. 19, 1946; for DDT concentrate solution; since Jan. 21, 1946.

496,956. General Biochemicals Inc., Chagrin Falls, Ohio; filed Feb. 20, 1946; for alpha tocopherol, carotene, inositol, etc.; since Nov. 17, 1944.

497,068. Channell Chemical Co., Chicago, Ill.; filed Feb. 23, 1946; for clarification of water; since Feb. 7, 1946.

497,096. R. M. Hollingshead Corp., Camden, N. J.; filed Feb. 23, 1946; for insecticide repellent; since Jan. 16, 1945.

497,684. Union Oil Co. of California, Los Angeles, Cal.; filed Mar. 5, 1946; for organic hydroperoxides; since June 14, 1945.

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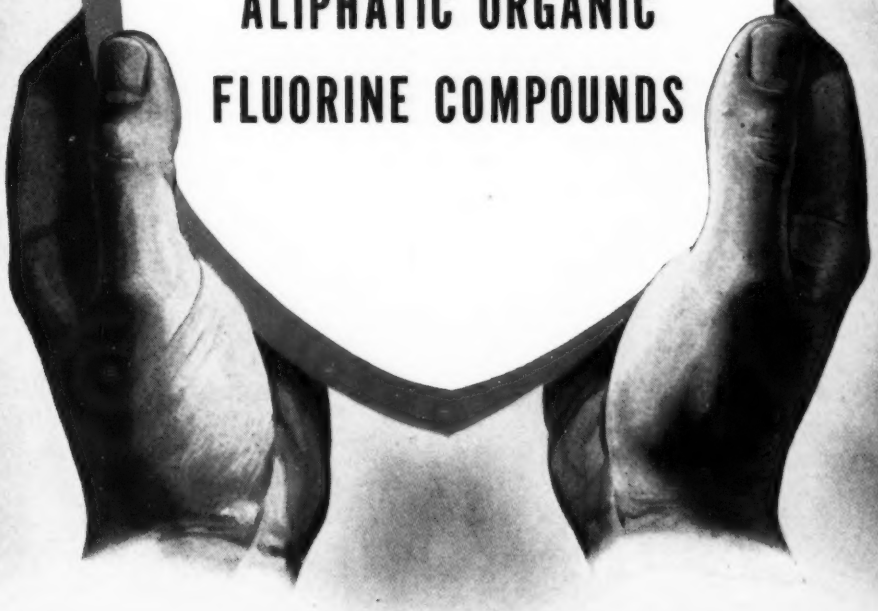

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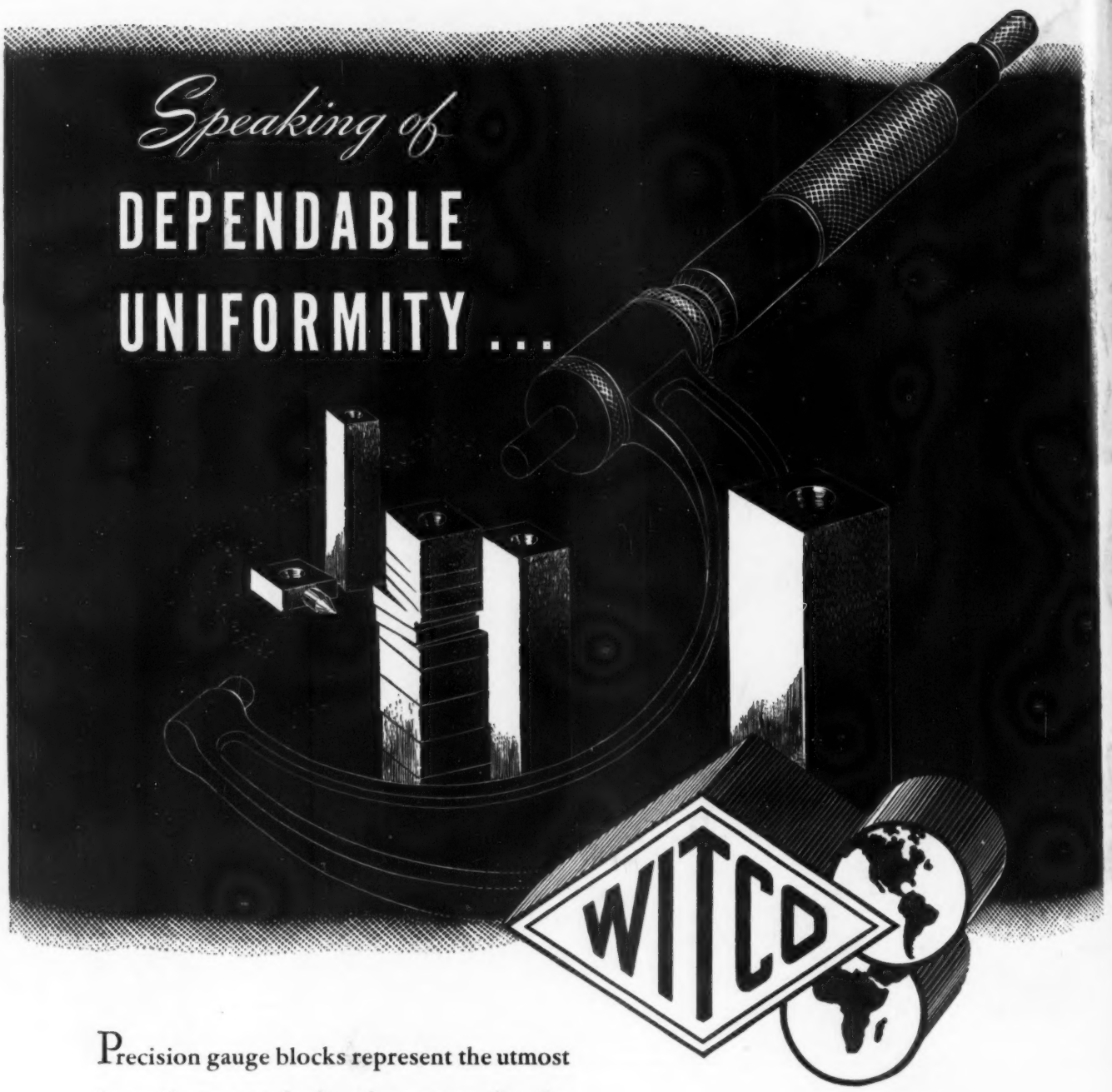

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